INDIA
RUBBER WORLD

OUR
65th YEAR

A BILL BROTHERS PUBLICATION

NOVEMBER, 1953

Proof of CABOT'S 100% SERVICE in the THERMAL BLACK FIELD . . .

Now!

DU PONT POLYAC®

STIFFENING AGENT AND ACTIVATOR FOR BUTYL RUBBER ACCELERATION

is

Pelletized

- **IT'S NON-DUSTING**
- **EASIER TO HANDLE**
- **HAS IMPROVED DISPERSION IN BUTYL STOCKS**

FOR GREATER CONVENIENCE in handling and for easier processing of your Butyl stocks, Du Pont *Polyac* is now pelletized.

This new form of *Polyac* has all the advantages of the old. First of all, there's the feature of *Polyac* activation. When used with Butyl Accelerator 21, for instance, *Polyac* imparts high modulus, low set, and improved hot tear strength. And, with *Polyac*, you reduce the tendency of "green" inner tubes to crease in storage and you also improve the quality of the splice.

Why not check all these advantages of new pelletized *Polyac* in your own plant?

WRITE OR PHONE OUR NEAREST DISTRICT OFFICE FOR FURTHER INFORMATION

DISTRICT OFFICES:

Akron 8, Ohio, 40 E. Buchtel Ave.....HEmlock 3161
Atlanta, Ga., 1261 Spring St., N. W.....EMerson 5391
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DU PONT RUBBER CHEMICALS

DU PONT
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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

India RUBBER WORLD, November, 1953, Vol. 129, No. 2. Published monthly by BILL BROTHERS PUBLISHING CORP. Office of Publication, 1309 Noble Street, Philadelphia, Pa., with Editorial and Executive Offices at 386 Fourth Avenue, New York 16, N. Y., U.S.A. Entered as Second Class Matter at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription United States and Mexico, $5.00 per year; Canada $6.00; All other Countries $7.00; Single Copies 50 cents. Address Mail to N. Y. Office.

News about

B. F. Goodrich Chemical *raw materials*

Improve and save on your rubber processing with Good-rite Vultrol

*REG. U. S. PAT. OFF.

Vultrol

...PROTECTS AGAINST SCORCHING
...PERMITS UNINTERRUPTED PRODUCTION
...REDUCES "DEAD" STOCKS
...REQUIRES NO SPECIAL HANDLING

Good-rite Vultrol offers you many advantages for rubber processing. It is ideal for preventing scorching not only during the hot weather months—but the year round. It retards scorch at processing temperatures, and also acts as a mild activator at curing temperatures.

Check these additional Vultrol advantages. It is beneficial on heavy-loaded or highly-accelerated compounds, and is particularly effective with high abrasion furnace blacks.

Supplied as a free-flowing flake, Vultrol requires no special handling. It is most effective when added to the latter stages of mixing. Economical and easy to use. Saves time, money and labor! For further information about Good-rite Vultrol, please write Dept. HA-11, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

Good-rite *Rubber Chemicals*

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON organic colors

A great big hug for **Philblack* I**
keeps tire costs low and mileage high!

As tire test data on commercial production of Philblack I accumulates—both on our own test vehicles and by tire manufacturers—we are more than ever convinced that this latest addition to the Philblack family is just what the doctor ordered for super performance of tire treads at moderate cost. And growing acceptance indicates that Philblack I may soon be as popular as Philblack A, Philblack O and Philblack E.

Find out about Philblack I, the new ISAF (Intermediate Super Abrasion Furnace) black that helps you make better products . . . and better profits. It's made to order for premium quality tire treads demanded by today's higher horsepower automobiles. Durability plus . . . at reasonable cost!

For complete information about the entire Philblack family consult our technical representative or write our nearest office.

PHILLIPS CHEMICAL COMPANY

PHILBLACK SALES DIVISION

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* A Trademark

The Philblacks are manufactured at Borger, Texas. Warehouses in Akron, Boston, Chicago, and Trenton. West Coast agent: Harwick Standard Chemical Company, Los Angeles. Canadian agent: H. L. Blachford, Ltd., Montreal and Toronto.

The superflexing Antioxidant that put "SUPER" in SUPERior

HEAVY-SERVICE TRUCK TREADS	NO FLEXAMINE	1.0 part FLEXAMINE
De Mattia Flex Cracking Data	306,000 Kilocycles	612,000 Kilocycles
Tensile retained after aging 96 hours in Oxygen Bomb	11%	60%
Tensile retained after aging 96 hours in hot air at 212° F.	51%	62%

FLEXAMINE—The powder blend that disperses rapidly and completely to assure maximum protection in both synthetic and natural rubber.

Use **Flexamine** in **Molded Soles, V-Belts, Conveyor Belts,** and general **Mechanical Goods** to provide excellent resistance against heat, as well as against oxidation and flexing fatigue.

Use **Flexamine** in **Wire Insulation** and **Linesmen's Gloves** and **Aprons** to inhibit deterioration caused by oxidizing action of copper and manganese.

Detailed information on **Flexamine** appears in a new Compounding Research Report No. 26. Write on your letterhead to address below.

PROCESS — ACCELERATE — PROTECT with NAUGATUCK CHEMICALS

Naugatuck Chemical
Division of United States Rubber Company

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NAUGATUCK, CONNECTICUT

IN CANADA: NAUGATUCK CHEMICALS DIVISION • Dominion Rubber Company, Limited, Elmira, Ontario

Rubber Chemicals • Aromatics • Synthetic Rubber • Plastics • Agricultural Chemicals • Reclaimed Rubber • Latices

NEW-DIFFERENT-AND NEEDED!

Plio-Tuf G75C

Plio-Tuf G85C

High Styrene Resins Having High Heat Resistance and High Impact Strength

Heat distortion point of 195°F. @ 66 psi (ASTM D648). Notched Izod Impact of 8 ft.-lbs./in. of notch @ 77°F. High tensile strength. Hardness. Toughness. Stiffness. Light weight. Light color. Low water absorption. Excellent chemical resistance. Excellent electrical properties. Easy processability. Ready post-formability. All these are yours—without curing—without blending with rubber—in the new PLIO-TUF G75C and PLIO-TUF G85C.

NOT A RUBBER-RESIN BLEND

PLIO-TUF G75C and G85C are two completely different high styrene copolymers recently developed by Goodyear. They are pure resins—not rubber-resin blends. PLIO-TUF G75C is designed for use alone. PLIO-TUF G85C is designed for use with G75C or various rubbers to increase hardness, tensile or heat softening points. Both are now available in quantity as white powders.

NO CURING NEEDED

PLIO-TUF G75C is easily compounded and processed. Release agents and pigments are all that are needed. Extenders may be added for lower cost. Conventional rubber or plastic mixing equipment can be used. The compounds are readily calendered, extruded or molded. Polished or embossed sheets are easily post-formed by vacuum or mechanical drawing. PLIO-TUF G85C blended with PLIO-TUF G75C exhibits similar processing characteristics.

EASILY FABRICATED

Products made from PLIO-TUF resins can be sawed, drilled, punched, tapped, turned, sewed, cemented, sanded, polished, hot stamped or painted. Typical suggested uses include luggage, carrying cases, containers, tote boxes, pipe, fittings, rods, tubes, automotive and equipment parts, housings, door panels, toys, protective helmets, kitchen utensils, handles and many other molded, post-formed or fabricated items for home and industry.

Investigate the possibilities of these challenging, new PLIO-TUF resins, today. Get full information, samples and technical assistance simply by filling out the coupon.

CHEMICAL GOODYEAR DIVISION

The Goodyear Tire & Rubber Company, Inc.
Chemical Division, Akron 16, Ohio

Please send me full details and sample of new PLIO-TUF resins.

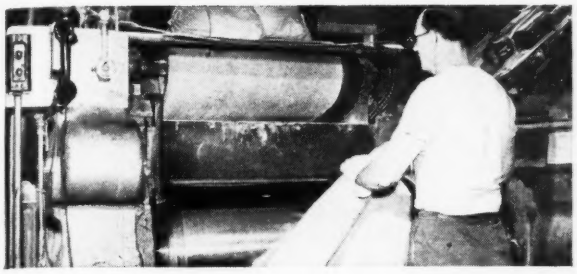
☐ I am a fabricator interested in PLIO-TUF sheets.
☐ I am a processor interested in PLIO-TUF resins.

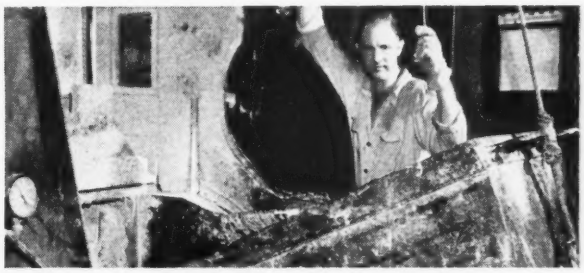
Name_____

Company_____ Position_____

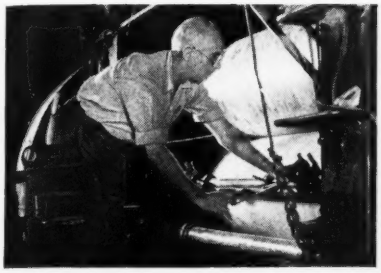
Address_____

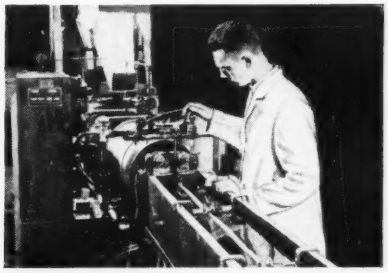
Look What You Can Do With Plio-**Tuf!**

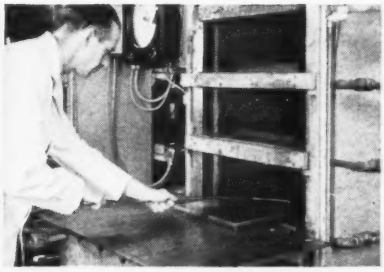




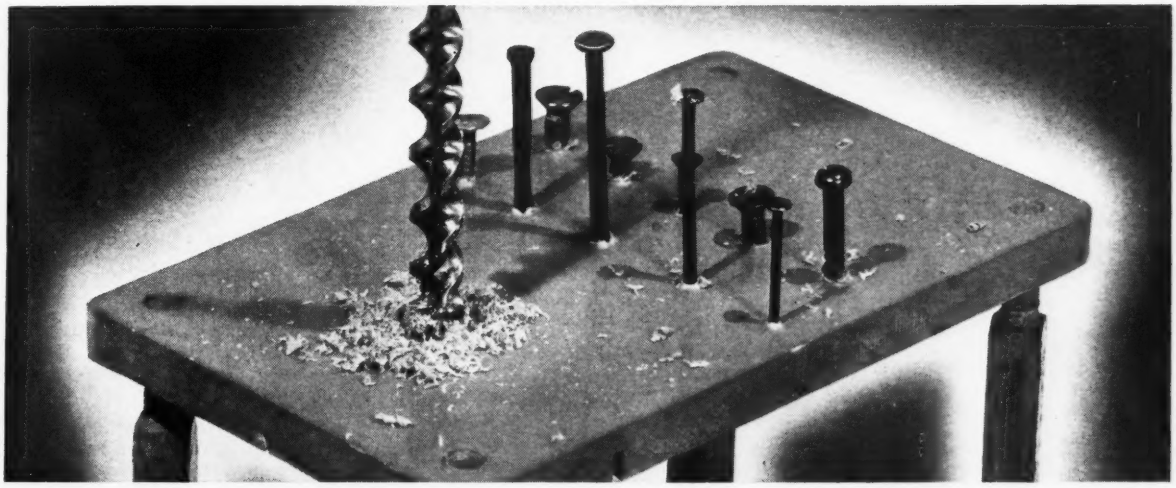
Plio-Tuf can be compounded on conventional rubber or plastic mixing equipment.



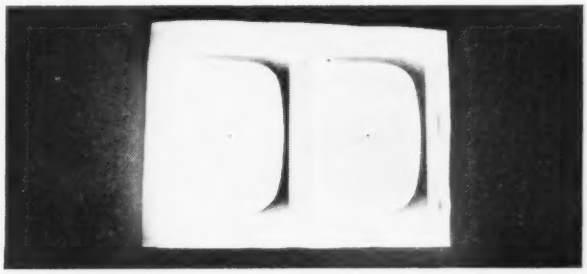




Plio-Tuf can be calendered, extruded, compression or transfer molded.



Plio-Tuf can be sawed, punched, drilled, tapped, turned, sewed, cemented, sanded, polished, hot stamped, painted.



Plio-Tuf sheets are tough, flexible—readily post-formed into items such as television masks.

We think you'll like "THE GREATEST STORY EVER TOLD"—every Sunday—ABC Radio Network
THE GOODYEAR TELEVISION PLAYHOUSE—every other Sunday—NBC TV Network

Chemigum, Pliobond, Pliolite, Plio-Tuf, Pliovic, Wing-Stay–T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

Use-Proved Products — CHEMIGUM • PLIOBOND • PLIOLITE • PLIO-TUF • PLIOVIC • WING-CHEMICALS — The Finest Chemicals for Industry

"Out in the cold"? Not with Skellysolve!

Skellysolve for Rubber and Related Industries

Applications

SKELLYSOLVE B. For making quick-setting cements for the shoe, tape, container, tire and other industries. Quick-drying, with no foreign taste or odor in dried compound. Closed cup flash point about −20°F.

SKELLYSOLVE C. For making quick-setting cements with a somewhat slower drying rate than those compounded with Skellysolve B. Closed cup flash point about 13°F.

SKELLYSOLVE D. For cements and variety of manufacturing operations. Good odor. Quick drying. Minimum of heavy, greasy compounds. Closed cup flash point about 3°F.

SKELLYSOLVE H. For general use in manufacturing operations and cements, where faster evaporation rate than that of Skellysolve D is desired. Closed cup flash point about −20°F.

SKELLYSOLVE V. For use wherever a relatively slow drying solvent is desired. Closed cup flash point about 50°F.

SKELLYSOLVE R. For general use in tire building and a variety of other manufacturing operations and cements. Reduces evaporation losses. Medium quick final dry. Lessens bloating and skinning tendency. Closed cup flash point about −25°F.

"DOC" MacGEE SAYS: Your product will never be "out in the cold" because of solvent uncertainties – not when you standardize on Skellysolve. More than 20 years' experience proves you can depend on Skellysolve to guard the quality of your product – and to help keep your plant operations rolling smoothly . . . with no time out because of solvent let-downs.

You're never in doubt about Skellysolve's uniformity. Every batch has the same over-all properties to protect your product's high quality and to enhance its sales appeal. Here is uniformity guarded by Skellysolve's laboratory tests, unsurpassed manufacturing methods, plus strict quality controls. Remember, too, that Skellysolve is not a "sideline" with us, but a major product operation.

What features do you look for in your solvents? If they're low end points, controlled evaporation, low vapor pressure, a minimum of unsaturates and pyrogenic decomposition products—you get them *all* with Skellysolve!

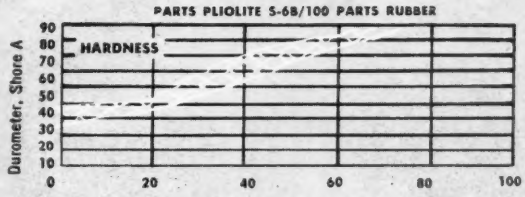
And Skellysolve's minimum of low and high boiling compounds helps reduce rejects due to blushing and blisters. Controlled vapor pressure reduces danger of bloated containers . . . and minimum of low boiling compounds eliminates "seeds" from rubber cements. Freedom from greasy residues assures rubber cements of high bonding strength.

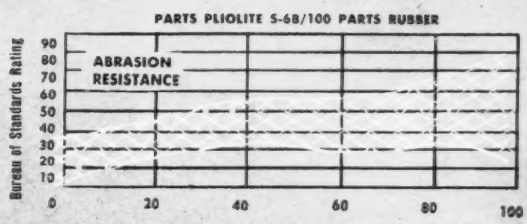
Write now for more complete technical facts. And if you require special help on solvent applications, you are invited to consult with the Skellysolve Technical Fieldman.

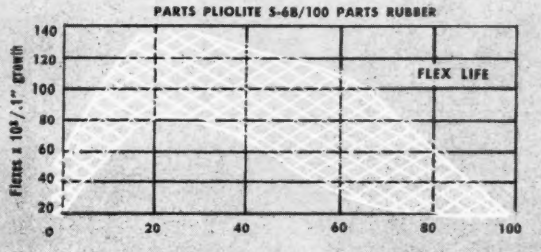
SKELLY

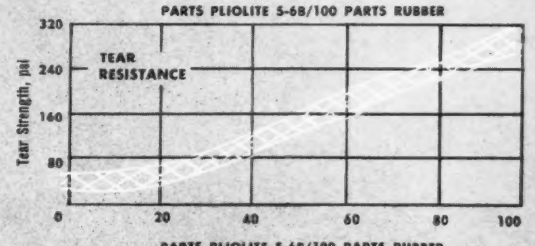
Skellysolve

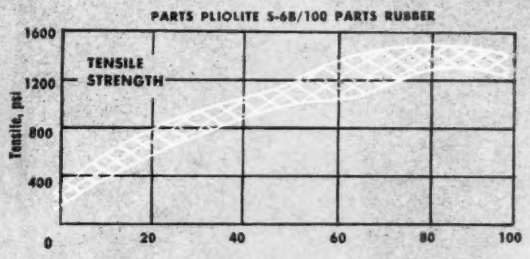
SOLVENTS DIVISION, SKELLY OIL COMPANY,
KANSAS CITY, MISSOURI

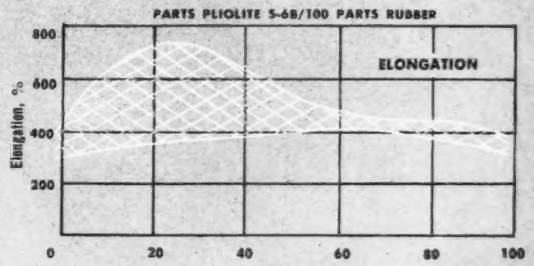




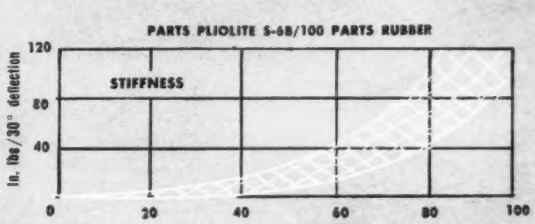








Note: The accompanying graphs are approximate in nature, as they depict the ranges of individual properties exhibited by PLIOLITE S-6B in gum stocks of different types of synthetic rubbers.



HERE'S WHY— HERE'S HOW PLIOLITE S-6B Improves Rubber

PLIOLITE S-6B is a high styrene-butadiene copolymer resin. It is specifically designed and made to reinforce rubber. It is carefully polymerized so as to be rapidly dispersed and completely compatible with virtually any type of natural or synthetic rubber. It is the outstanding rubber reinforcing resin on today's market.

A glance at these graphs is all that's needed to show how effectively PLIOLITE S-6B hardens, strengthens and stiffens synthetic rubber. Keep in mind, too, that this use-proved resin also substantially improves abrasion resistance, flex life, tear strength, electrical properties, handling characteristics and appearance of the rubber with which it is used.

Proof of improvements possible with PLIOLITE S-6B is easily obtained on your own mills and testing equipment. You can get adequate samples and full technical information and assistance by writing to: Goodyear, Chemical Division, Akron 16, Ohio.

CHEMICAL GOODYEAR DIVISION

Chemigum, Pliobond, Pliolite, Plio-Tuf, Pliovic—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

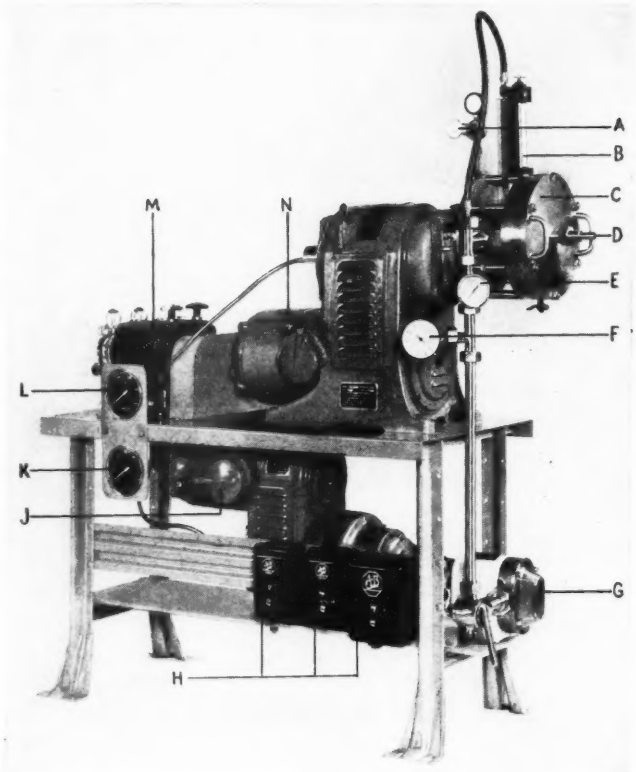
Use-Proved Products — CHEMIGUM • PLIOBOND • PLIOLITE • PLIO-TUF • PLIOVIC • WING-CHEMICALS — The Finest Chemicals for Industry

FOAM RUBBER MIXING BY PUSH-BUTTON METHOD!

Continuous — Automatic!

We know this may sound a bit bombastic because foaming latex by oldtime conventional batch methods is a sticky business that takes a lot of back and brawn, and leaves plenty of room for error. But continuous, automatic, push-button mixing under fingertip control is now being provided by Oakes Continuous Automatic Mixers in large and small plants everywhere. The superiority of product is such, and the savings so substantial in so many directions, that plants wishing to maintain their competitive position in today's swiftly expanding market are finding Oakes Mixers an absolute essential.

The Oakes Continuous Automatic Mixer is capable of foaming latex to a blow-up of as much as 16 to 1, with a throughput capacity of 50 to 1800 pounds of wet latex per hour—predetermined density can be obtained at will and held uniformly. The resultant product is of exceptional quality—uniformly fine-celled and velvet-smooth, with maximum strength. Production is up to 900 pounds per hour with the smaller model, and up to 1800 pounds per hour with the larger. Savings in latex and all other formula materials, of as much as 15% have been realized; "rejects" have been reduced as much as 75%. In plants producing upwards of 1,000 pounds per hour savings in labor have been as much as six people. Foam is more stable. Injection molding is made possible. Less floor space is required; refrigerated, air conditioned rooms are unnecessary. These are but a few of the features that have made the Oakes preferred equipment.



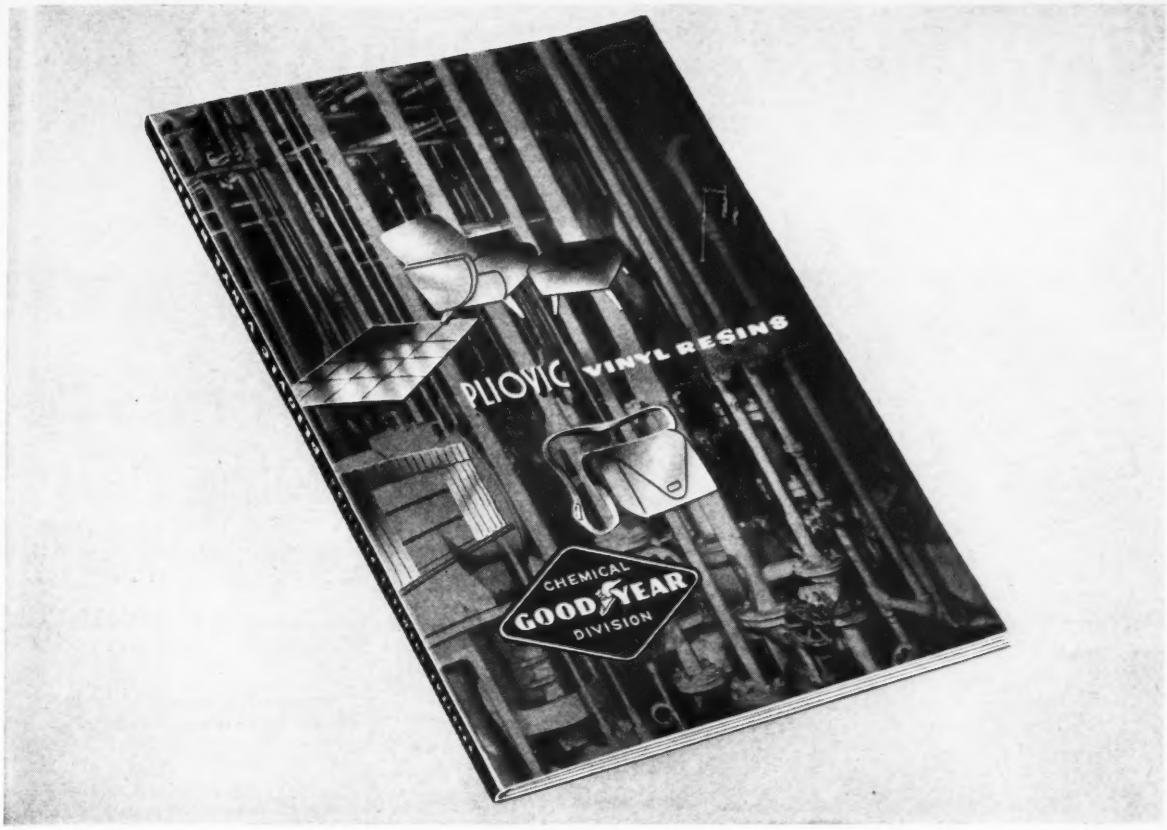
A. Air Pressure Regulating Valve
B. Air Flowmeter
C. Mixing Head
D. Discharge Hose Connection
E. Product Thermometer
F. Pressure Gauge
G. Latex Pump
H. Starting Boxes
J. Pump Speed Regulator
K. Pump Tachometer
L. Mixer Speed Tachometer
M. Chemical Proportioning Pumps
N. Mixer Speed Regulator

Oakes Continuous Automatic Mixer

Available only through

THE E. T. OAKES CORPORATION

ISLIP, LONG ISLAND, NEW YORK



NEW AID to better vinyl products—**IT'S FREE!**

HERE'S a big, new help for you toward improving your products made with vinyl resins. It's a factual, 52-page, illustrated, technical manual—just off the press—that gives you full, fast-reading information on PLIOVIC—Goodyear's series of superior polyvinyl chloride resins.

What PLIOVIC is—where to use it—how to compound it—how to process it—what end properties you can expect—these are just some of the important questions answered in this easily read booklet which, incidentally, is but one example of the extra service Goodyear gives you on PLIOVIC.

You will find it well worth while to receive—and read—this informative manual. Just as you find it well worthwhile to sample and use easy processing PLIOVIC in the manufacture of any high quality calendered, extruded or molded product. For the new booklet, samples and full technical assistance, write to:

Goodyear, Chemical Division
Akron 16, Ohio

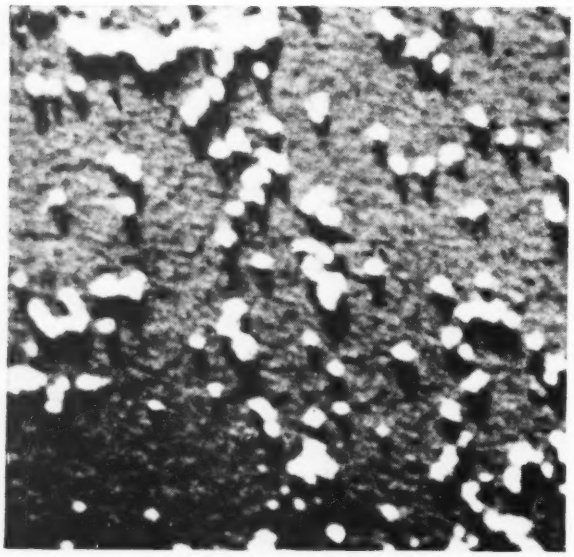
We think you'll like "THE GREATEST STORY EVER TOLD"
every Sunday—ABC Radio Network
THE GOODYEAR TELEVISION PLAYHOUSE
every other Sunday—NBC TV Network

CHEMICAL
GOODYEAR
DIVISION

Chemigum, Pliobond, Pliolite, Plio-Tuf, Pliovic—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

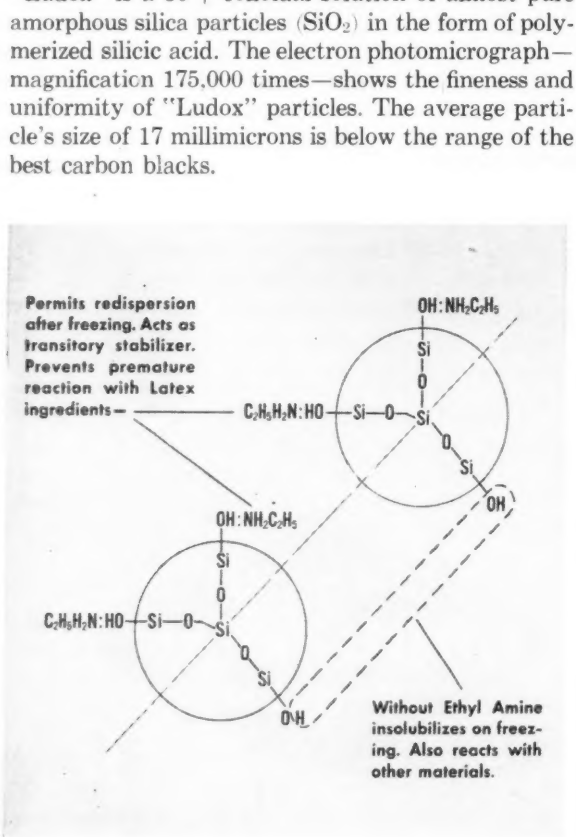
Use-Proved Products—CHEMIGUM • PLIOBOND • PLIOLITE • PLIO-TUF • PLIOVIC • WING-CHEMICALS—The Finest Chemicals for Industry

How Du Pont "LUDOX" can



What "LUDOX" is

"Ludox" is a 30% colloidal solution of almost pure amorphous silica particles (SiO_2) in the form of polymerized silicic acid. The electron photomicrograph—magnification 175,000 times—shows the fineness and uniformity of "Ludox" particles. The average particle's size of 17 millimicrons is below the range of the best carbon blacks.


Permits redispersion after freezing. Acts as transitory stabilizer. Prevents premature reaction with Latex ingredients—
OH:NH2C2H5
C2H5H2N:HO—Si—O—Si
Si
O
OH
Without Ethyl Amine insolubilizes on freezing. Also reacts with other materials.

Any of these valuable modifying effects can be produced by adding "LUDOX" to latex formulations

- Improved Adhesion
- Increased Stiffness
- Increased Water Resistance
- Increased Abrasion Resistance
- Decreased Dry Tack

How "LUDOX" works

The diagram at left shows surface hydroxyl groups on "Ludox" particles. These groups make the particles chemically reactive in contrast to commonly used dry fillers. This reactivity has led to many unusual properties and uses for "Ludox" in the latex field. The diagram also shows a typical "Ludox" reaction—with and without monoethylamine. The reaction with ethyl amine is useful in the stabilization of some latices containing "Ludox."

improve latex products

Your chemists can create new combinations of properties in latex-dipped goods, coatings, adhesives . . . whatever products you make—using Du Pont "Ludox"* colloidal silica. And new properties can mean new sales advantages —new markets for your products.

Here are some examples of how "Ludox" has improved latex products:

Neoprene thread was produced with a nearly doubled modulus over the entire range of elongation. Seven parts of "Ludox" were added per 100 parts neoprene latex. Modulus can be increased, too, in natural rubber films.

In neoprene-coated belting, adhesion was improved and flaking stopped by adding "Ludox." In a paper saturant, abrasion resistance was increased 20 to 40%!

A natural-rubber adhesive was doubled in strength of leather-to-leather adhesion when 20 parts of "Ludox" solids were added per 100 parts natural rubber latex solids. Such outstanding improvements have also led to the use of "Ludox" in GRS and neoprene latex adhesives and coatings.

An uncured Buna N solvent coating on cloth had no surface tack whatsoever when treated with "Ludox." In decreasing or eliminating tackiness, "Ludox" can be applied as an aftercoat or, in the case of latex, incorporated in the compound.

Neoprene films have shown exceptional increases in water resistance and decreases in water swelling upon addition of 20 parts "Ludox" solids per 100 parts neoprene latex solids.

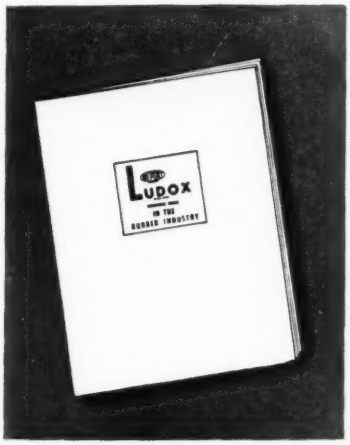
Neoprene foam required about 20% less solids to attain a given modulus when 5 parts of "Ludox" solids were added per 100 parts dry neoprene. This saving of raw material was obtained without affecting flex life, bend flex, or compression set.

In these and other cases "Ludox" has provided combinations of properties difficult to achieve by any other means.

What's more, a little "Ludox" goes a long way.

To learn more about how silica chemistry with Du Pont "Ludox" can help improve your products, mail the coupon below, or write on your letterhead today. *REG U.S. PAT OFF

Send for this informative booklet: "'LUDOX' in the Rubber Industry"



E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Department, Wilmington 98, Delaware

Name_____ Title_____

Company_____

Address_____

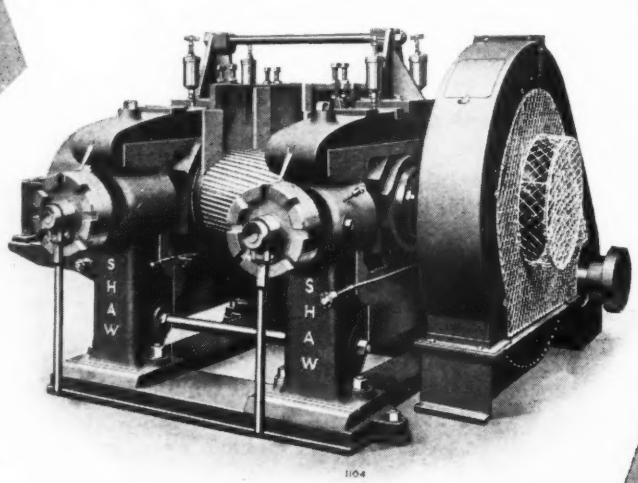
City_____ State_____

DU PONT "LUDOX" COLLOIDAL SILICA

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING...*THROUGH CHEMISTRY*

get cracking



A 24" x 20 Cracker with chilled-cast iron rolls, steel beds, frames, caps and bearing blocks, for cracking down raw rubber prior to mastication or for use in conjunction with a line of warming mills.

SHAW

THERE IS A COMPLETE RANGE OF SHAW CALENDERS, GRINDERS, REFINERS, MIXERS AND WARMING MILLS FOR THE RUBBER INDUSTRY.

FRANCIS SHAW & COMPANY LIMITED, MANCHESTER 11, ENGLAND

LONDON OFFICE: 34 VICTORIA STREET, LONDON S.W.1

Enquiries to Francis Shaw (Canada) Ltd., Grahams Lane, Burlington, Ontario, CANADA

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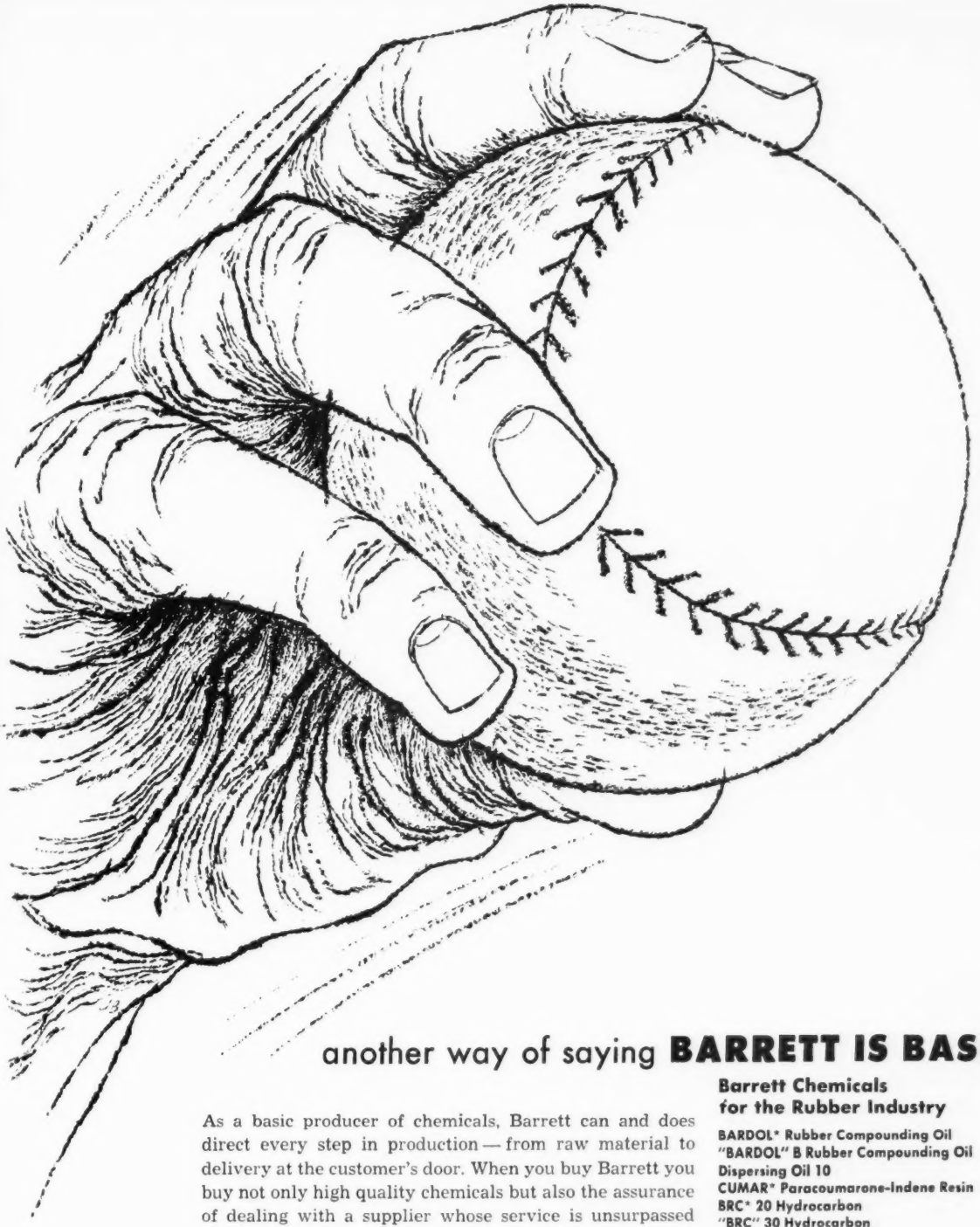
CONTROL of Quality, Uniformity, Supply



another way of saying **BARRETT IS BASIC**

As a basic producer of chemicals, Barrett can and does direct every step in production — from raw material to delivery at the customer's door. When you buy Barrett you buy not only high quality chemicals but also the assurance of dealing with a supplier whose service is unsurpassed in promptness, efficiency and general satisfaction.

Barrett Chemicals for the Rubber Industry

BARDOL* Rubber Compounding Oil
"BARDOL" B Rubber Compounding Oil
Dispersing Oil 10
CUMAR* Paracoumarone-Indene Resin
BRC* 20 Hydrocarbon
"BRC" 30 Hydrocarbon
BRV* Rubber Softener
BRT* 3 Rubber Reclaiming Tar
"BRT" 4 Rubber Reclaiming Tar
Resin "C" Resinous Compounding Material
Dibutyl Phthalate
ELASTEX* 28-P Plasticizer (DOP)
"ELASTEX" 10-P Plasticizer (DIOP)
"ELASTEX" DCHP Plasticizer
"ELASTEX" 50-B* Plasticizer
"ELASTEX" 80-P Plasticizer
(Dicapryl Phthalate)

Barrett

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Allied Chemical

ALLIED CHEMICAL & DYE CORPORATION

40 RECTOR STREET, NEW YORK 6, N. Y.

In Canada: The Barrett Company, Ltd., 5551 St. Hubert Street, Montreal, Que.

*Reg. U. S. Pat. Off.

REMEMBER THIS *tread?*

It is the tread of the Dayton "Thorobred" ...first tire in the industry to have a white tread and red sidewall

A tough job, indeed, would be that of picking from the scores of well-known automobile tires—either of yesterday or today —*one* tire as being the most distinctive in appearance. On what could you base such a selection . . . tread design? . . . color, perhaps?

Whatever tire you might finally select, we're sure you'd dwell long on the striking features that distinguished the "Thorobred." Introduced in 1912 by the Dayton Rubber Company, the singular design of its gleaming white tread, and the dark red of its sidewalls made the "Thorobred" one of the most unique tires on the road.

Half a decade *before* the "Thorobred," The Bridgwater Machine Company began manufacturing molds for the tire industry. In the near half-century since, we have not only watched the pageant of "name" tires rolling from the great rubber plants, but in our *own* shops we have produced the molds for most of them.

Typical of the specialized service Bridgwater makes available to the tire industry *today,* are the modern, complete facilities of our Athens Machine Division, the only plant in the world devoted *exclusively* to tire mold making.

Here, the specialized skills of Bridgwater's long experienced engineers and metalworking craftsmen are focused on the sole job of making higher quality molds at the favorable costs well known to the tire industry.

ATHENS MACHINE DIVISION

THE BRIDGWATER MACHINE COMPANY

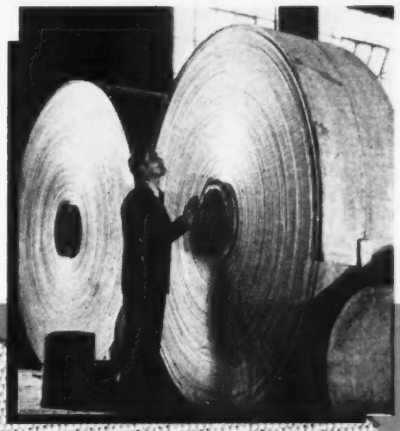
Akron, Ohio

1784

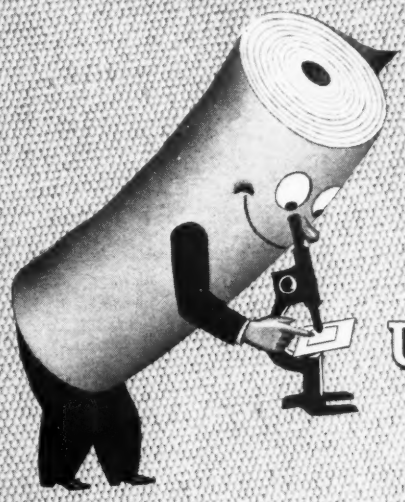
UNIFORMITY

Makes The Big Difference

In INDUSTRIAL FABRICS



MT. VERNON FABRICS GIVE YOU GREATER UNIFORMITY



One of a series of comprehensive laboratory controls throughout production to assure uniformity in all Mt. Vernon-Woodberry products. Here yarn number is being determined with Suter Scales.

FABRICS ENGINEERED TO FIT YOUR NEEDS

Need adaptation of an existing fabric to your special purposes? Or creation of an entirely NEW fabric —cotton, synthetic or blend — to meet your specifications? Mt. Vernon-Woodberry's staff of textile engineers is available on request to help you with your problems in development or application of industrial fabrics.

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For Rubber Compounding Use VELSICOL RESINS

NOW AVAILABLE IN VARYING MELTING-POINT RANGES AND COLORED GRADES

SOME SUGGESTED APPLICATIONS:

- Mechanical Goods
- Electrical Insulation Compounds
- Rubber Shoe Soles and Heels
- Rubber Floor Tiling
- Gaskets and Jar Rings
- Rubber Adhesives and Cements
- Molded Rubber Products
- Tubular Compounds
- Reclaimed Rubber Sheeting
- Colored Rubber Stocks
- Battery Cases
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FEATURES:

1. THERMOPLASTIC HYDROCARBON RESINS.
2. COMPATIBLE WITH NATURAL AND SYNTHETIC RUBBERS.
3. EFFECTIVE PLASTICIZERS AND SOFTENERS . . . in highly-loaded clay stocks or in recipes incorporating carbon black.
4. MILL READILY.
5. EXCELLENT DISPERSING AGENTS FOR FILLERS AND PIGMENTS.
6. FACILITATE PROCESSING PROCEDURES . . . impart excellent milling, calendering processing and tubing characteristics to stocks.
7. IMPART EXCELLENT PERFORMANCE CHARACTERISTICS . . . such as good tensile strength, elongation and modulus, as well as good resistance to abrasion and aging.
8. POSSESS HIGH ELECTRICAL RESISTANCE PROPERTIES.
9. AID IN THE DEVELOPMENT OF NON-SCORCHY STOCKS . . . without excessive retardation of cure at high temperatures.

For additional information concerning properties and applications of Velsicol Resins, WRITE:

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330 East Grand Avenue, Chicago 11, Illinois

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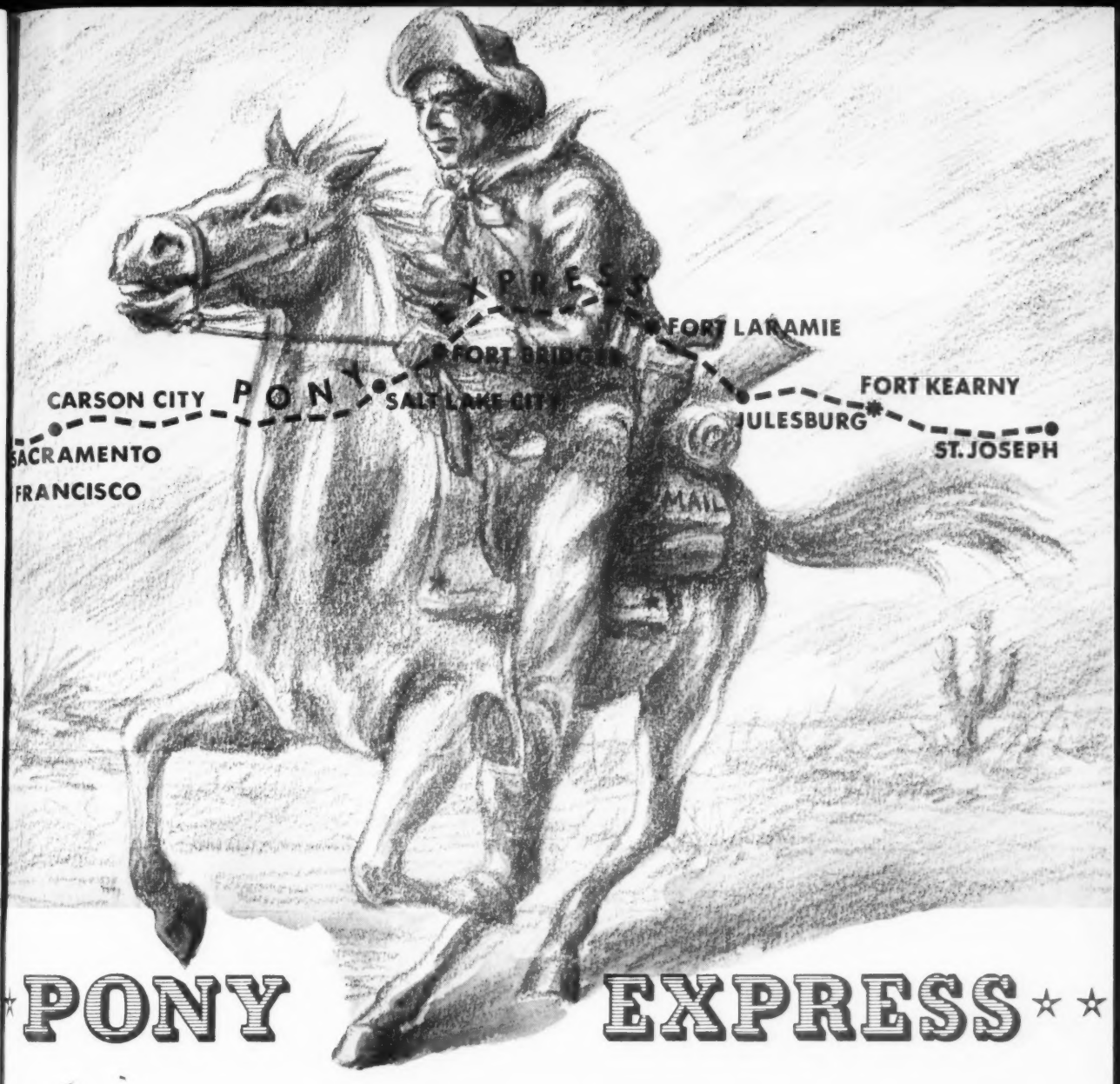
PETROLEUM DERIVED CHEMICALS — VELSICOL — SERVING BASIC INDUSTRIES

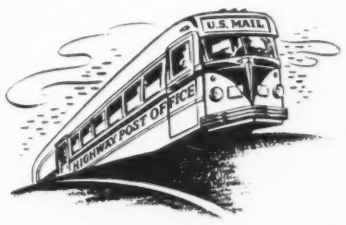


★ PONY EXPRESS ★★

No attempt in America's history to bring about swifter communication was more daring, more romantic than the Pony Express. Though it was destined to be short-lived, the memory of it still excites the imagination of youth and oldsters alike.

The trail extended from St. Joseph, Missouri, to the Pacific. Riders rode in "stages" of from 10 to 15 miles per horse. Neither hot plains, steep mountains, fearful storms nor Indians deterred these swift couriers from their appointed rounds. The fastest trip made between the two points was seven days and 17 hours, when Lincoln's first inaugural address was taken to the west coast. Sixteen months after its start the Pony Express had vanished into history, telegraph service having been completed from coast to coast.

Countless are the uses of motor trucks in the postal service today, within communities, on "Star" routes, and, of fairly recent development, the highway post office. With the help of the rubber tire, written and printed communication between people is transported by "The swift couriers in their appointed rounds." No locality, no roadside mail box is too remote.



Just as "shoeing" gave the pony support, today's tires are "shod" with carbon black, giving durability and strength. United Black are made to maintain the high standard of rubber manufacturers' tires. Wherever such tires are used they, too, take swift couriers on their appointed rounds.

UNITED CARBON COMPANY, INC.

Kosmos 70, United's most recent oil base black, is a marvel of strength and stamina for wear and flex resistance among the Superior Abrasion Furnace (SAF) type blacks. But even more, Kosmos 70 is a safe processing black readily adaptable to synthetic and natural rubber.

Put your faith in United blacks. They will keep your tires rolling.

UNITED CARBON COMPANY, INC.

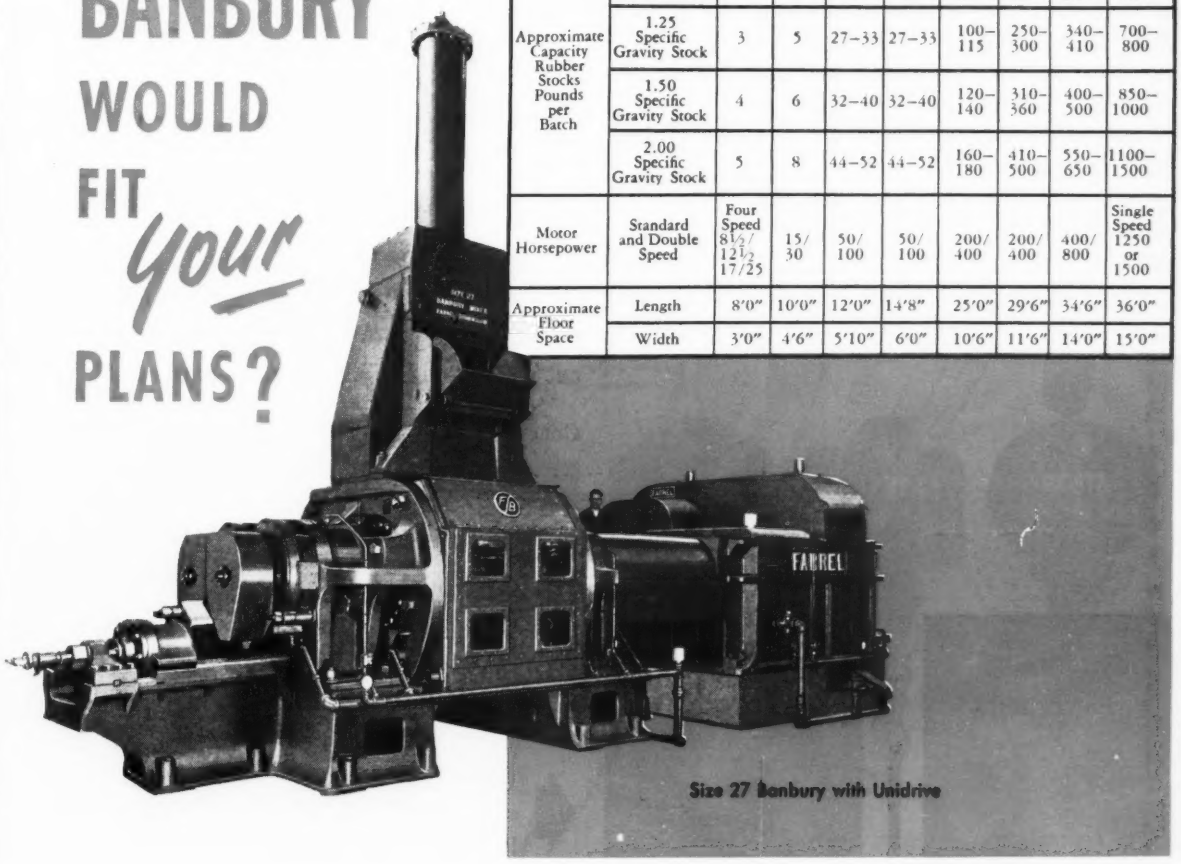
CHARLESTON 27, WEST VIRGINIA

NEW YORK AKRON CHICAGO BOSTON MEMPHIS

CANADA: CANADIAN INDUSTRIES, LTD.

WHICH BANBURY WOULD FIT *your* PLANS?

Size of Machine		B	00	1	1-A	3-A Unidrive	9	11 Unidrive	27 Unidrive
Net Volume of Chamber—Cubic Inches		103	263	1193	1193	4315	11443	14940	37709
Approximate Capacity Stiff Paste Pounds per Batch	Factor x Specific Gravity	Sp.Gr. x 2.5	Sp.Gr. x 4	Sp.Gr. x 24	Sp.Gr. x 24	Sp.Gr. x 85	Sp.Gr. x 225	Sp.Gr. x 300	Sp.Gr. x 600
Approximate Capacity Rubber Stocks Pounds per Batch	Crude Rubber	2	4	24	24	90	225	300	600
	1.25 Specific Gravity Stock	3	5	27–33	27–33	100–115	250–300	340–410	700–800
	1.50 Specific Gravity Stock	4	6	32–40	32–40	120–140	310–360	400–500	850–1000
	2.00 Specific Gravity Stock	5	8	44–52	44–52	160–180	410–500	550–650	1100–1500
Motor Horsepower	Standard and Double Speed	Four Speed 8½/12½ 17/25	15/30	50/100	50/100	200/400	200/400	400/800	Single Speed 1250 or 1500
Approximate Floor Space	Length	8'0"	10'0"	12'0"	14'8"	25'0"	29'6"	34'6"	36'0"
	Width	3'0"	4'6"	5'10"	6'0"	10'6"	11'6"	14'0"	15'0"



Size 27 Banbury with Unidrive

Your choice should not be a hard one because Banbury mixers are available in a wide range of sizes from the size B for laboratory or small production work to the huge No. 27 capable of mixing 1000 pounds of rubber stock in a single batch.

Between the laboratory Banbury and the size 27 are 5 other sizes of various capacities, some with variations in construction permitting the selection of the right machine to suit individual requirements. With such a range of machines to choose from, you can select the mixer that will provide the production you need.

Furthermore, Farrel-Birmingham engineers have developed other production units, such as extruders, warming and sheeting mills and calenders which are matched in capacity with the various sizes of Banburys. This means that a layout can be engineered that will eliminate the "choking" or "starving" of any machine in the line.

Farrel-Birmingham engineers will be glad to assist you in the selection of the right Banbury for your plans.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Akron, Chicago, Los Angeles, Houston

Farrel-Birmingham®

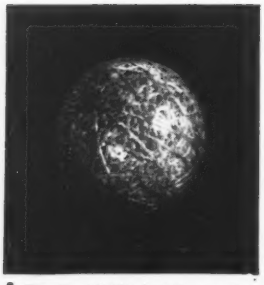
FB-871

Top visibility... because of TITANOX® white pigment

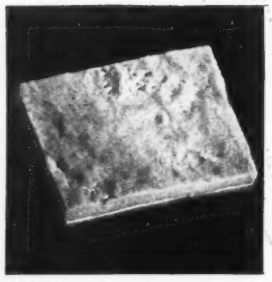
On green or fairway, this glistening white ball is always visible. That's because it's pigmented from the inside out with TITANOX white titanium pigments.

Consultation with our Technical Service Department is available to firms desiring assistance on rubber and plastic pigmentation problems. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Atlanta 2; Boston 6; Chicago 3; Cleveland 15; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 9, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments Limited, Montreal 2; Toronto 1.

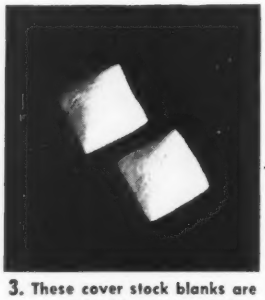
These steps show how visibility is built into a modern golf ball. Courtesy of the Acushnet Process Company, New Bedford, Mass.



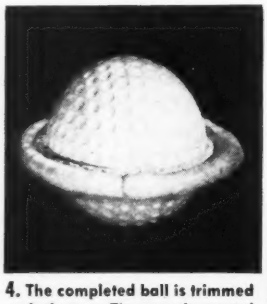
1. The liquid-filled rubber center is tightly wound with hundreds of feet of rubber thread.



2. Balata, the raw material for the cover stock, is a neutral grey before pigmentation.



3. These cover stock blanks are pigmented with TITANOX before molding into cups that form the cover.



4. The completed ball is trimmed and then a Titanox-pigmented coating is applied.

® TITANOX

the brightest name in pigments

1815

TITANIUM PIGMENT CORPORATION

Subsidiary of NATIONAL LEAD COMPANY

YOU'LL find it easier to unlock the door to better plasticizer performance when you buy from a single, *basic* plasticizer source.

So call on Pittsburgh PX Plasticizers *first!* From coal to final processing in the company's new and modern plasticizer plant, Pittsburgh PX Plasticizers are quality controlled at every step of production . . . to assure you a product of optimum purity and stability.

And to help you select and apply the right Pittsburgh PX Plasticizers to your production, the assistance of a Pittsburgh Sales Service Representative, *who sells nothing but plasticizers,* is immediately available.

For wide choice, for uniform quality, for prompt, dependable deliveries and for experienced sales service . . . call for Pittsburgh PX Plasticizers.

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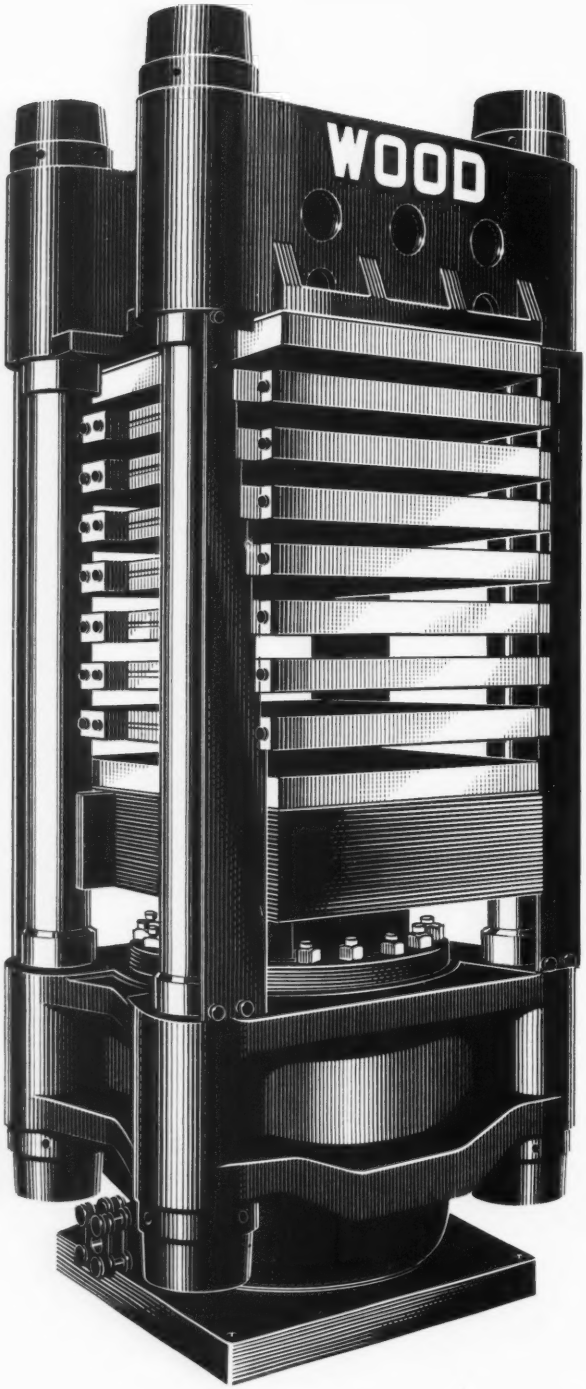

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". . . that industrial equipment which has maintained high excellence in manufacture will continue to be sold, and will contribute its worth to uplifting the general quality of everything produced in industrial America . . ."

870-ton capacity multiple-opening hydraulic press designed for processing rubber and plastic sheets. *Write for catalogs of our hydraulic presses.*

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For better age-resistance natural and synthetic rubber

WITCO SUNOLITE® WAX

SUNOLITE WAX is made in WITCO's Chicago plant.

- ★ Lighter in color than other anti-sunchecking waxes. No adverse effect on white or pastel stocks.
- ★ Equal or superior to other waxes as an inhibitor of static atmospheric and corona cracking. Tests show 3 to 5 parts Sunolite per 100 parts GR-S 100% effective after 18 months' exposure!
- ★ Useful as frosting preventive . . . imparts good flex cracking resistance.
- ★ Melts and disperses readily at mixing temperatures.

Comparison tests show SUNOLITE outstanding for tire sidewalls, wire jacket and insulation, mechanicals, footwear, garden hose, automotive specialties and sundry goods.

Write today for WITCO TECHNICAL SERVICE REPORT R-7 . . . gives comparison test results and technical data.

ITCO CHEMICAL COMPANY

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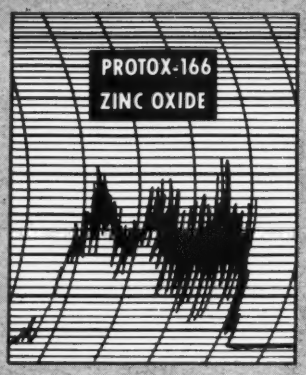
Save on Power Costs Cut Mixing Time with . . .

PROTOX*
Zinc Oxides

POWER CONSUMPTION CHARTS OF BUNA-N MASTERBATCHES

Conventional zinc oxide resists wetting by Buna-N and other high-Mooney polymers.



Protox-166 definitely plasticizes Buna-N and provides easier-processing stocks.

These wattmeter records, made on our laboratory Banbury, show how Protox oxides cut power costs of zinc masterbatching and shorten mixing time as compared with conventional oxides:

1. Protox oxides eliminate Banbury power peaks. Rubber's affinity for the coated Protox surfaces does away with power surges—thus cutting penalty payments for electricity beyond the contract demand limit.

2. Protox oxides use less power per batch. Their patented coating of zinc propionate plasticizes the rubber . . . makes mixing easier.

3. Protox oxides shorten mixing time. They have fewer aggregates . . . the latter are dispersed by our exclusive process——treatment with propionic acid.

These are only a few of the ways you save processing dollars with Protox oxides. It will pay you to take in a trial order now and count up all the advantages of Protox under your particular conditions.

*U. S. Patents 2, 303, 329 and 2, 303, 330

THE NEW JERSEY ZINC COMPANY

Producers of Horse Head Zinc Pigments

. . . most used by rubber manufacturers since 1852

160 Front Street, New York 38, N. Y.

SHELL DUTREX®

AN ECONOMICAL GROUP
OF PLASTICIZERS AND EXTENDERS
FOR RUBBER AND PLASTICS

SHELL

SHELL OIL COMPANY
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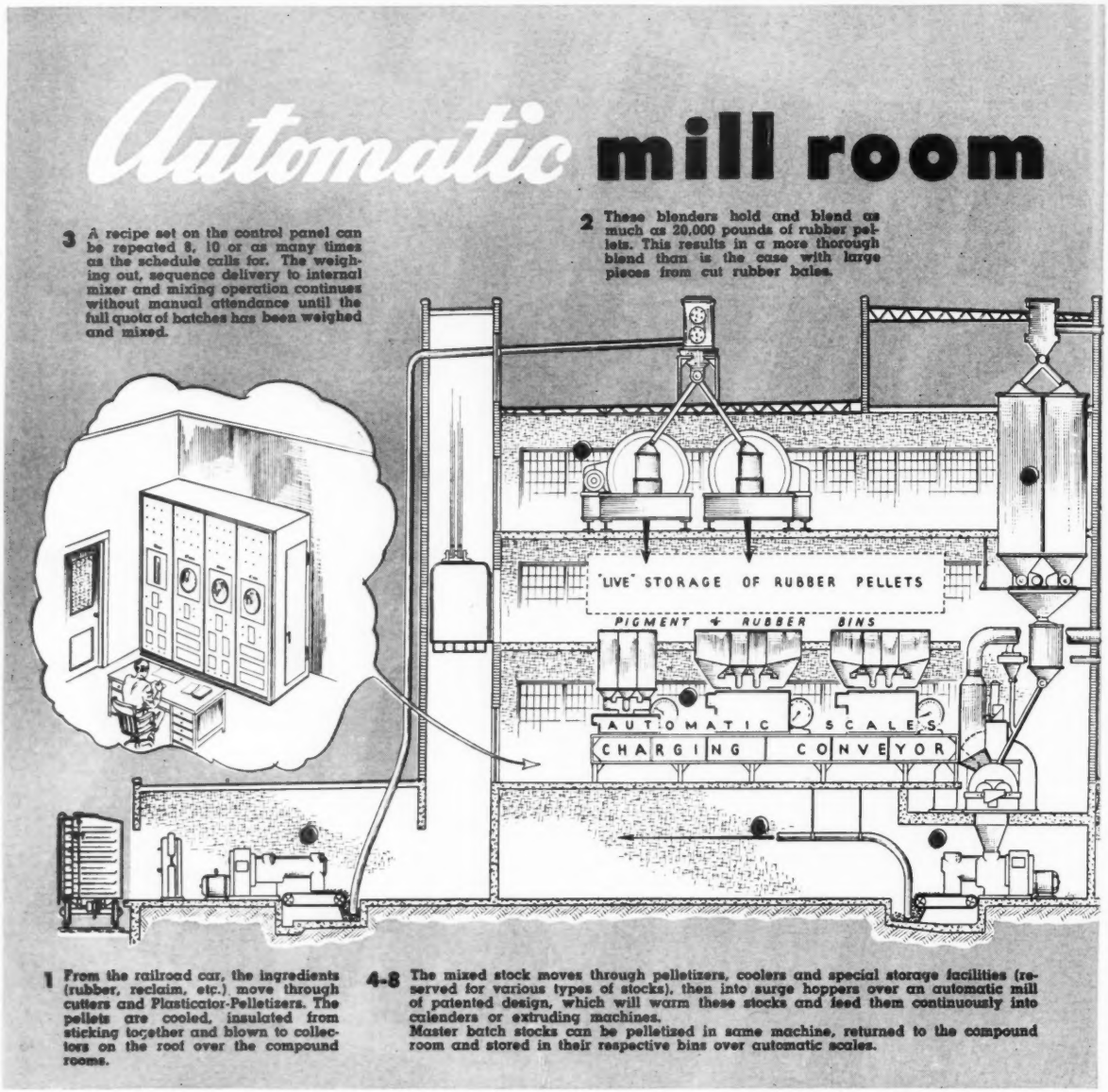
Automatic mill room


3 A recipe set on the control panel can be repeated 8, 10 or as many times as the schedule calls for. The weighing out, sequence delivery to internal mixer and mixing operation continues without manual attendance until the full quota of batches has been weighed and mixed.
2 These blenders hold and blend as much as 20,000 pounds of rubber pellets. This results in a more thorough blend than is the case with large pieces from cut rubber bales.
"LIVE" STORAGE OF RUBBER PELLETS
PIGMENT + RUBBER BINS
AUTOMATIC SCALES
CHARGING CONVEYOR
1 From the railroad car, the ingredients (rubber, reclaim, etc.) move through cutters and Plasticator-Pelletizers. The pellets are cooled, insulated from sticking together and blown to collectors on the roof over the compound rooms.
4-8 The mixed stock moves through pelletizers, coolers and special storage facilities (reserved for various types of stocks), then into surge hoppers over an automatic mill of patented design, which will warm these stocks and feed them continuously into calenders or extruding machines.
Master batch stocks can be pelletized in same machine, returned to the compound room and stored in their respective bins over automatic scales.

IS THIS FOR ME? WHAT ARE THE ADVANTAGES?

Each succeeding batch or formula can be changed.

New techniques in controls make the change setting of scales as simple as tuning in different stations on your radio. Now, the low volume producer with many kinds of stocks can consider automatic compounding and mixing.

More pounds per hour through the mixing equipment.

If you have a Banbury, the manufacturer has told you how to reduce mixing time. To increase the batches through your Banbury per hour, it is necessary to eliminate the human element which now throttles production.

Automatic scales weigh and deliver ingredients to the Mixer in a few seconds time. Hand scoops, carving knives and hand-set scales are ancient tools. Program controllers operate the Mixer. Pelletizers convert the mixed stock into pellets, which are cooled and blown into special bins. ALL LABOR has been eliminated!

Extruding or Calendering on the "Heavy Side" No Longer Necessary.

Hundreds of thousands of dollars worth of material can be saved yearly by extruding or calendering exact lineal weights. The intimate blending of the raw material and the precise weighing of all ingredients guarantees uniform gravities and physical properties.

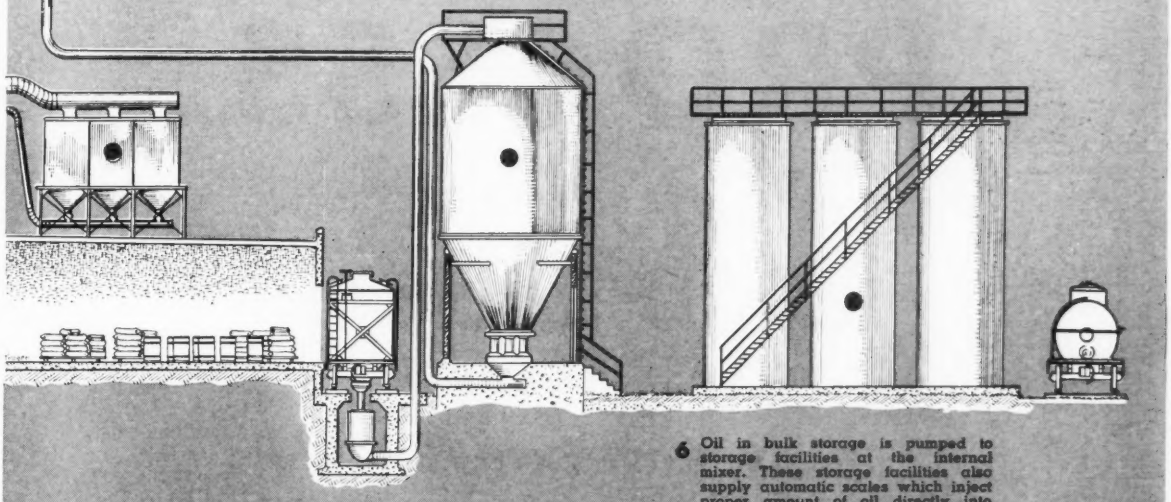
Automatic Weighing and Handling of Raw Materials and Mixed Stock

. . . from railway cars to calenders and extruders

5 Carbon Black, in Bulk Form, moves directly from railroad car to storage bin. By automatic control, black is dispatched to any one of a number of surge hoppers over the mixers. These in turn feed automatic scales which discharge the correct weight at proper rate directly into mixing chambers.

7 Dust from the mixing operation is collected continuously and returned to the Mixer for incorporation in the same batch from which it was originally taken.

In these two pages, we outline the specific advantages of an Automatic Mill Room. Hale and Kullgren is the first independent engineering firm to design such a plant. If you are interested in considering automation, Hale and Kullgren will survey your facilities and advise you on such factors as: savings; capital equipment needed; a recommended step-by-step program. Address your inquiry to: Hale and Kullgren, Inc., P. O. Box 1231, Akron, Ohio.



6 Oil in bulk storage is pumped to storage facilities at the internal mixer. These storage facilities also supply automatic scales which inject proper amount of oil directly into the mixing chamber.

NE

National Erie products for the Plastic and Rubber Industries • Extruders • Simplex Doors for Autoclaves • Mills and Hydraulic Presses.

This old and well-known line of machinery was acquired March 1, 1952, by The Aetna-Standard Engineering Company. They are manufactured in their Warren, Ohio and Ellwood City, Pa., plants. The sales and engineering of the National Erie line is the responsibility of Hale and Kullgren, Inc., Akron, Ohio.

COMPLETE SERVICE ON RUBBER & PLASTICS
a complete plant : a specialized process : an engineering service or individual machines

SALES and ENGINEERING by
HALE AND KULLGREN INCORPORATED
P. O. BOX 1231 · AKRON, OHIO

MANUFACTURING by
Aetna-Standard
THE AETNA-STANDARD ENGINEERING CO.
PITTSBURGH, PA.
Plants in Warren, Ohio
Ellwood City, Penna.

NOW MADE BY

PROCESS

Pequanoc #2500 Reclaim

for* • *Tire Side Walls

• Low Cost Extruded Parts

• Molded Items

The UNIBLENDER removes foreign material normally retained by conventional processes, thus assuring cleaner more uniform reclaims.

Ask our representative for details regarding the "UNIBLEND" process and what it will do to improve the quality of your product.

**Registered Trade Mark.*

Pequanoc Rubber Co.

MANUFACTURERS OF RECLAIMED RUBBER

MAIN SALES OFFICE and FACTORY: BUTLER, N. J.

NEW SILENE DATA BULLETIN!

Columbia-Southern's Technical Staff has just reviewed the compounding formulations and results of Silene, the rubber reinforcing pigment.

The new up-to-the-minute data has been compiled into 31 compact pages, in handy 6" x 9½" size, with margin perforations for easy binding.

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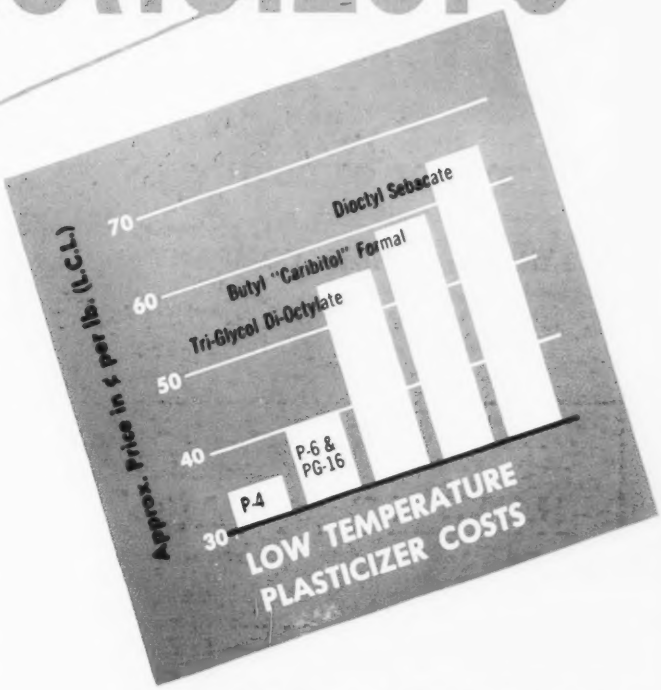

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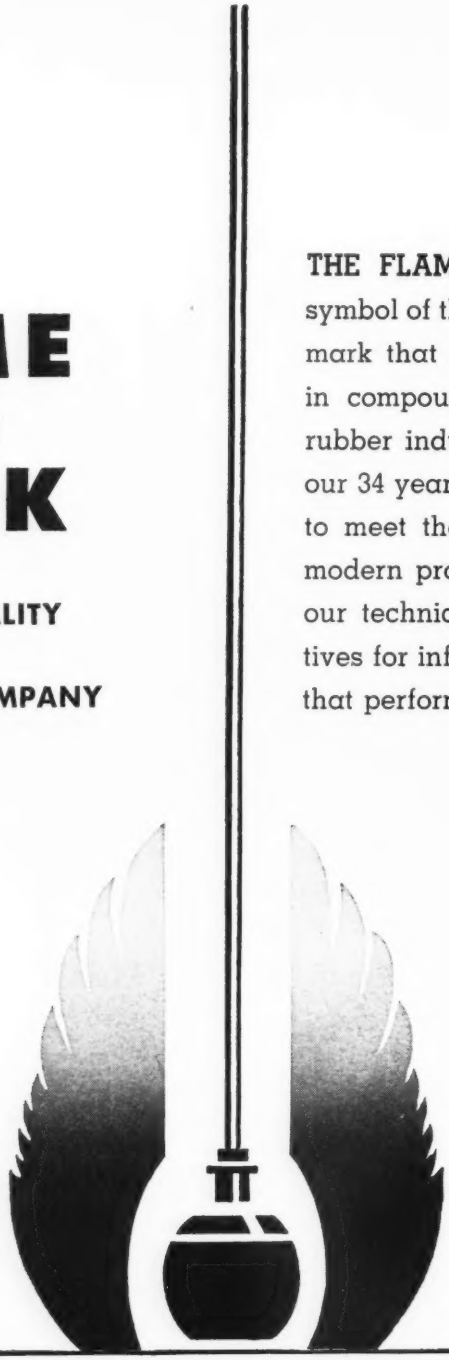

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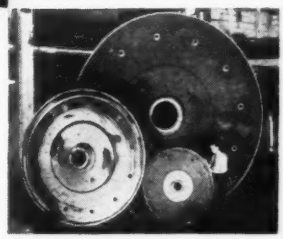

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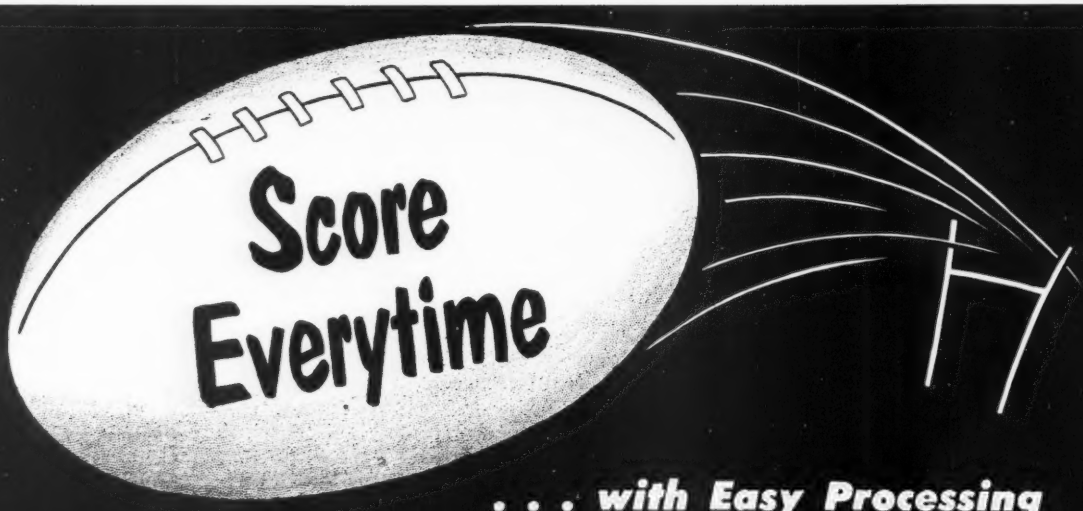

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Equipment News

PUBLISHED BY FARREL-BIRMINGHAM COMPANY, INC. — ANSONIA, CONNECTICUT

WHY FARREL-BIRMINGHAM PRODUCES SUPERIOR BANBURY* MIXER REPAIRS AND REBUILDING

Farrel-Birmingham does a better job of rebuilding a Banbury mixer than any repair shop could possibly do because, as the sole manufacturer of this machine for thirty-six years, the company has unequalled experience, facilities and know-how to return a worn Banbury mixer to its original work capacity. Furthermore a Banbury mixer rebuilt by Farrel-Birmingham benefits from a product-improvement research program that has been continually carried on during the entire period that this company has manufactured over 2,000 of these machines.

Especially in recent years, close study of performance records, persistent engineering effort and advancements in metallurgy have resulted in a number of important improvements to the Banbury mixer. Modern features of design and improved materials which provide higher operating efficiency and greater wearing qualities can now be incorporated into a machine being rebuilt, the same as in a new Banbury.

COMPLETE DRAWINGS

Farrel-Birmingham is the only company having complete drawings showing the original dimensions of every part of the Banbury mixer. This is essential information for correct and precise work in both rebuilding and making repairs to these machines.

When a part—such as a rotor, a door top, or the inside of the chamber body, for example—is worn, blueprints show the Farrel-Birmingham engineer just how much rebuilding is required to return the part to its original size, contour and work efficiency. There is no guessing.

When any one of the 775 parts, which make up a Banbury mixer, needs replacement, a company engineer can look at a drawing and specify the right part in a matter of minutes.

NECESSARY FACILITIES

Farrel-Birmingham is the only company having complete jigs, fixtures and gauges necessary for satisfactory repairs. 242 of the pieces of a new Banbury have to be machined, calling for a total of 882 operations to finish. The use of our special equipment and facilities in rebuilding work assures both accuracy and quick service.

A NEW-MACHINE GUARANTEE

Banbury mixers rebuilt by Farrel-Birmingham carry exactly the same

(*Continued on next page*)

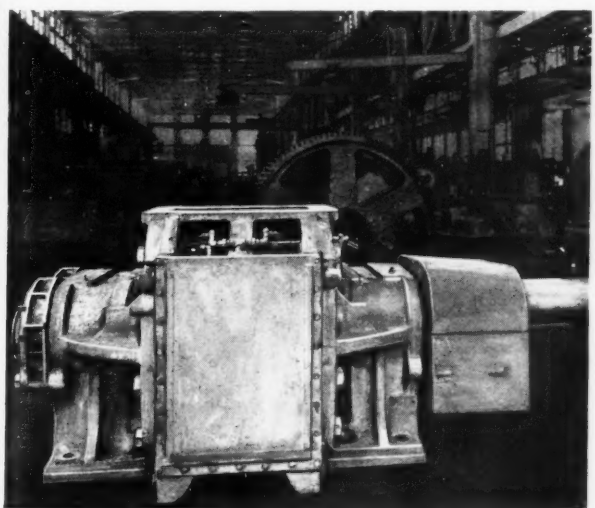

Fig. 1—Worn Banbury mixer body returned to Farrel-Birmingham for repairs.

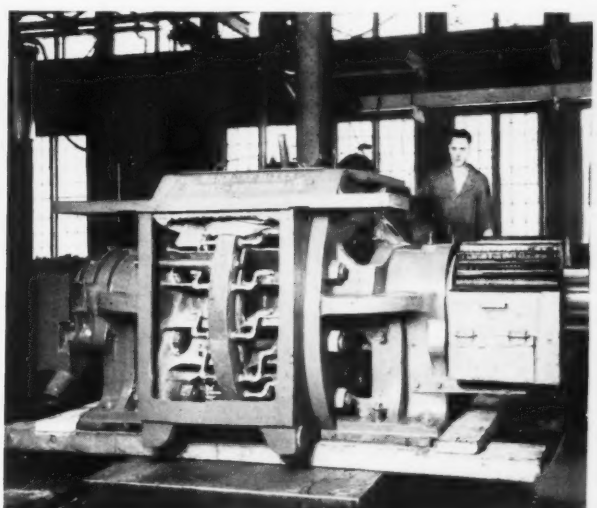

Fig. 2—Complete rebuilt body, reassembled and tested, guaranteed the same as a new machine.

* Trade Mark

FB-866

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Fig. 3—Candid shot of a worn rotor. Looks in bad condition, but it's not hopeless.

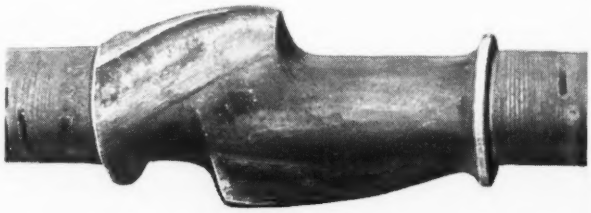

Fig. 4—Now the entire rotor—necks as well as body—has been built up to full original size.

guarantee as new machines. Such a guarantee by the original manufacturer provides assurance that the rebuilt machine will be "as good as new" when it is returned to service.

COSTS

The high quality of the Banbury repair work done by Farrel-Birmingham cannot be matched at lower prices—or at any price, for that matter. New parts are priced fairly; suitable allowances are made for old parts taken in trade.

PICTURES SHOW THOROUGHNESS

The accompanying illustrations (see figures 1 to 10) give an idea of the thoroughness of a Banbury rebuilding job at the Farrel-Birmingham Derby plant.

As soon as a worn Banbury, such as the one shown in figure 1, is received, the heavy grease and accumulation of rubber around the dust stops are removed by burning and scraping. After this, the body is dismantled and the parts are further cleaned by immersion in a degreasing tank. All parts are then inspected, magnafluxed for hidden cracks, and their condition recorded, with instructions for repair of all usable parts and replacement of those that cannot be salvaged.

ROTORS

Figures 4, 5 and 6 show how a worn rotor, such as the one illustrated in figure 3, is rebuilt. After the entire rotor —thread ends, journals, dust stop sections and gear fits, as well as the body itself—has been built up to full original size, it is then machined and ground to the proper dimensions. Figure 4 shows the built-up rotor before machining. In figure 5 the necks have been rough-machined and the body rough ground. Figure 6 shows the finished rotor, rebuilt to its exact, original dimensions.

It is in work like this that it counts so much to have the skill, the knowl-

Fig. 7—Hundreds of rotors for all sizes of Banbury mixers are in stock at the company's Derby plant.

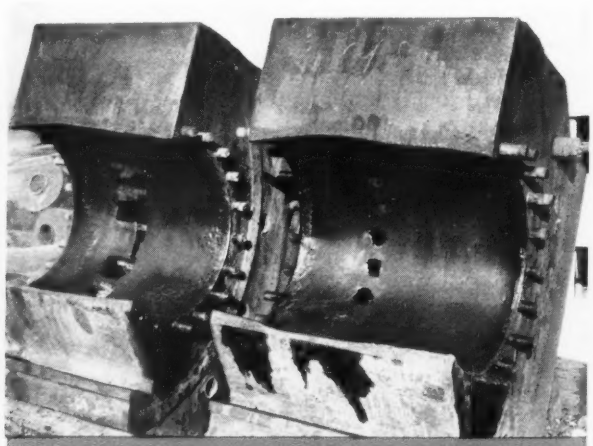

Fig. 8—These sides are badly worn, but can be repaired by inserting new liners, as shown in figures 9 and 10.

Fig. 5—Here the necks have been rough-machined and the body is being gauged after being rough-ground.

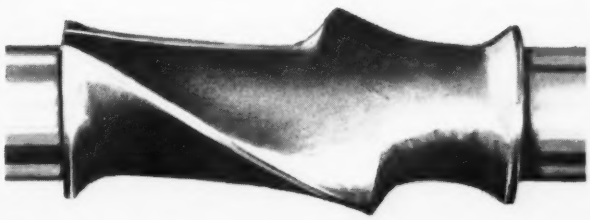

Fig. 6—Rebuilt rotor, completely restored to its original dimensions, ready for plenty of hard work.

edge, the original drawings and the special facilities found only where new Banbury mixers are manufactured.

SIDES

Sides as badly worn as those in figure 8 can still be salvaged by boring and then welding in new liners. Figure 9 shows a bored side ready for the insertion of the new liner, and in figure 10 the new liner is being gauged after having been ground to exact size.

When the damage is not so great, the bore of the liner is built up with hard-surfacing metal, and then machined and ground to accurate dimensions. In either case, the rebuilt side, when completed, is as good as new.

OTHER PARTS

These operations on two of the larger parts are just examples of how thoroughly a Banbury mixer body is rebuilt at Farrel-Birmingham. End frames, door top and cylinder, dust stops, thrust collars, connecting gears and all other parts also receive careful examination and are either restored to "good-as-new" condition, or, if necessary, replaced.

Figure 2 shows a complete rebuilt body, reassembled, tested and ready to leave the shop, carrying a new-machine guarantee.

FREE INSPECTION SERVICE

A complete and competent inspection service, by factory-trained mechanics, is available to all users of Banbury mixers in the United States. A request will bring an inspector to your plant, promptly and without cost to you. He will examine your machines thoroughly, report to you on their condition, and recommend exactly what needs to be done to put them into first-class shape.

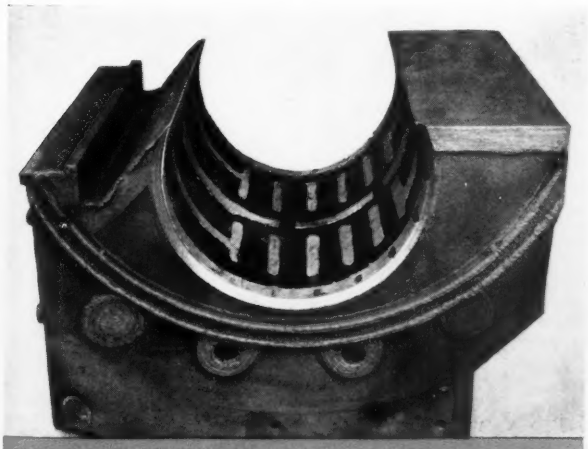

Fig. 9—This side has been bored, ready for a special-alloy, one-piece liner to be welded in.

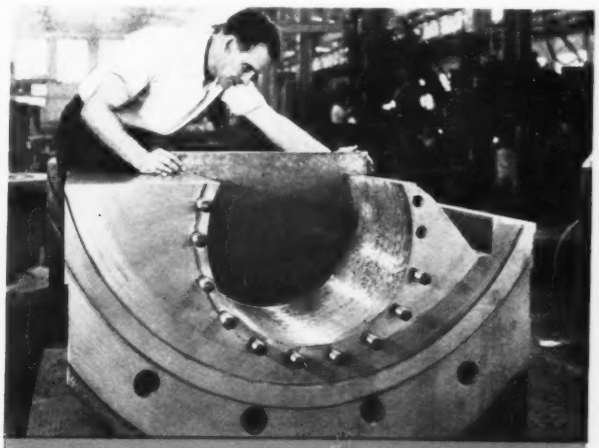

Fig. 10—New liner is receiving a final gauging after having been ground to exact size.

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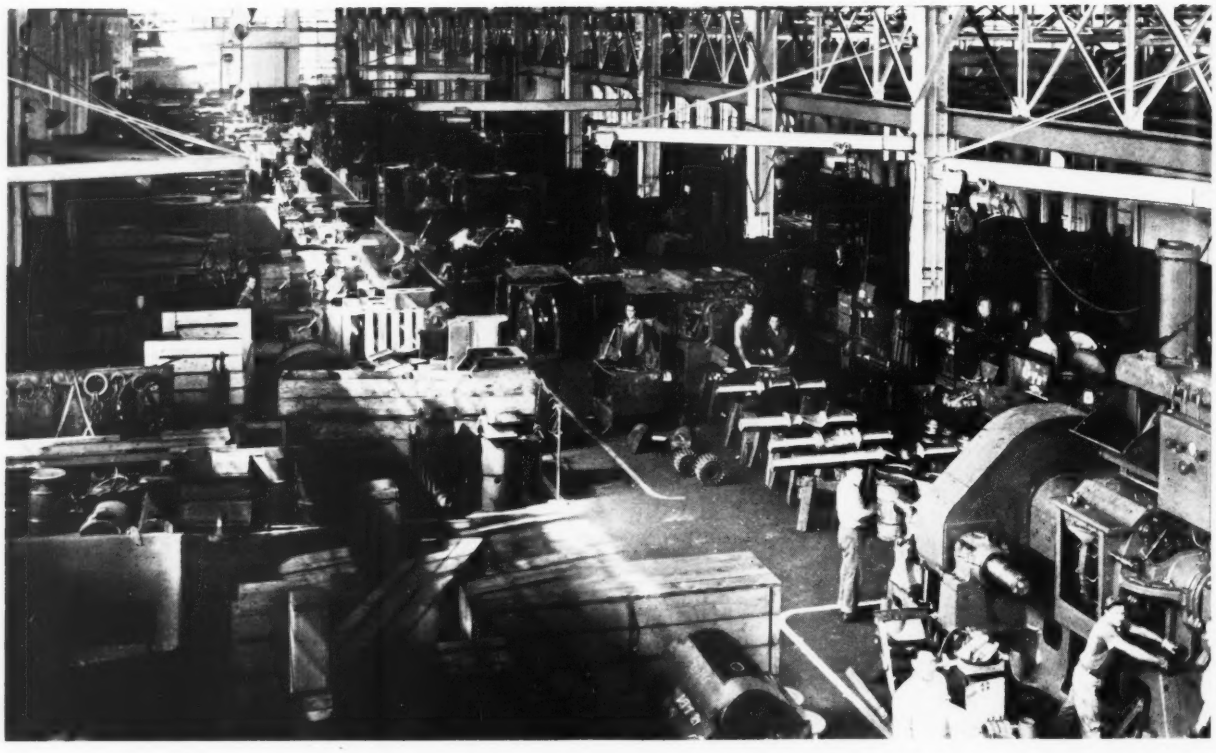

Fig. 11 (above)—Erecting floor in Farrel-Birmingham plant where Banbury mixers, new and rebuilt, are assembled.

Fig. 12 (below)—Some of the million-dollar stock of Banbury mixer parts in the Farrel-Birmingham plant.

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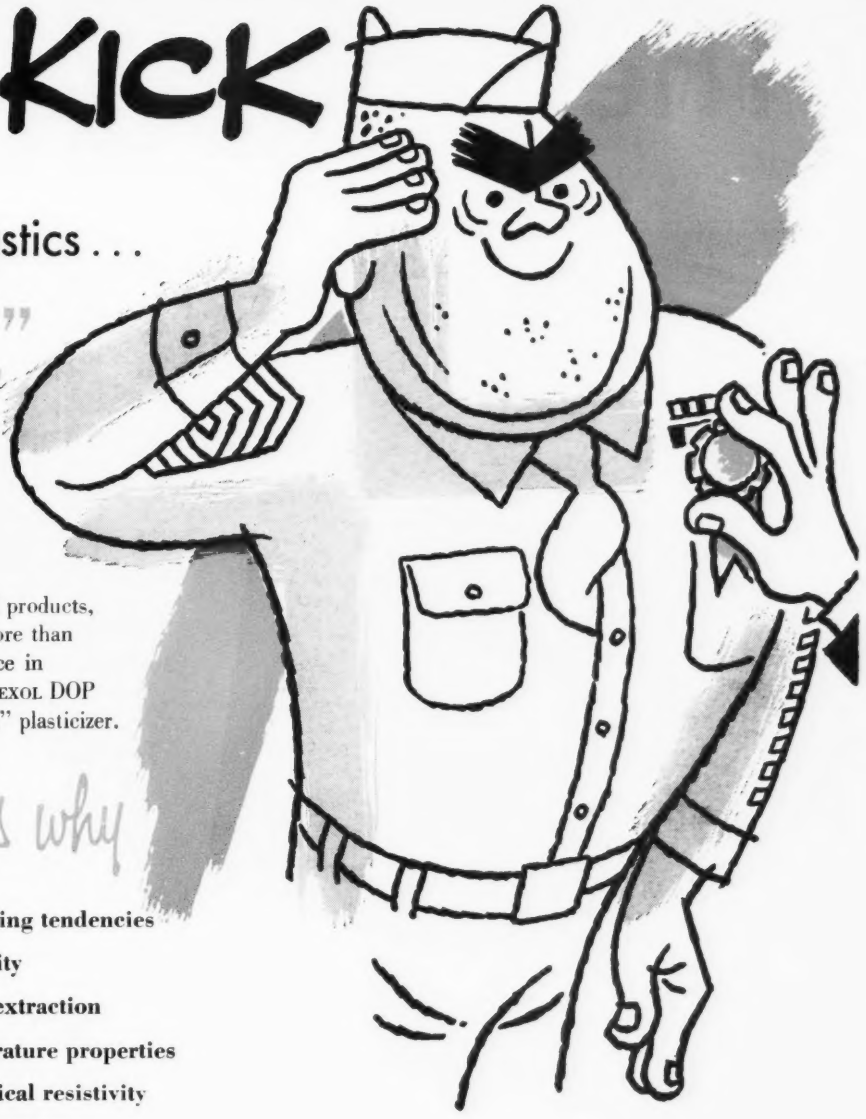

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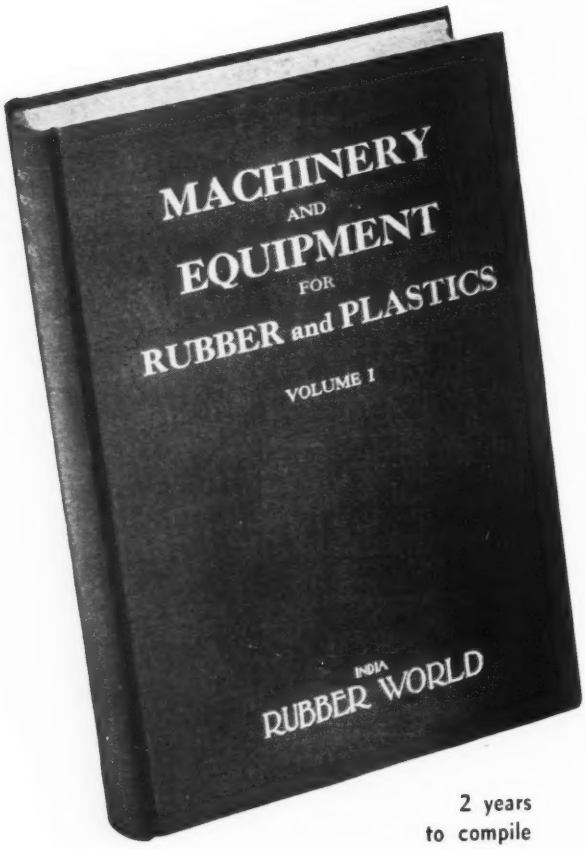

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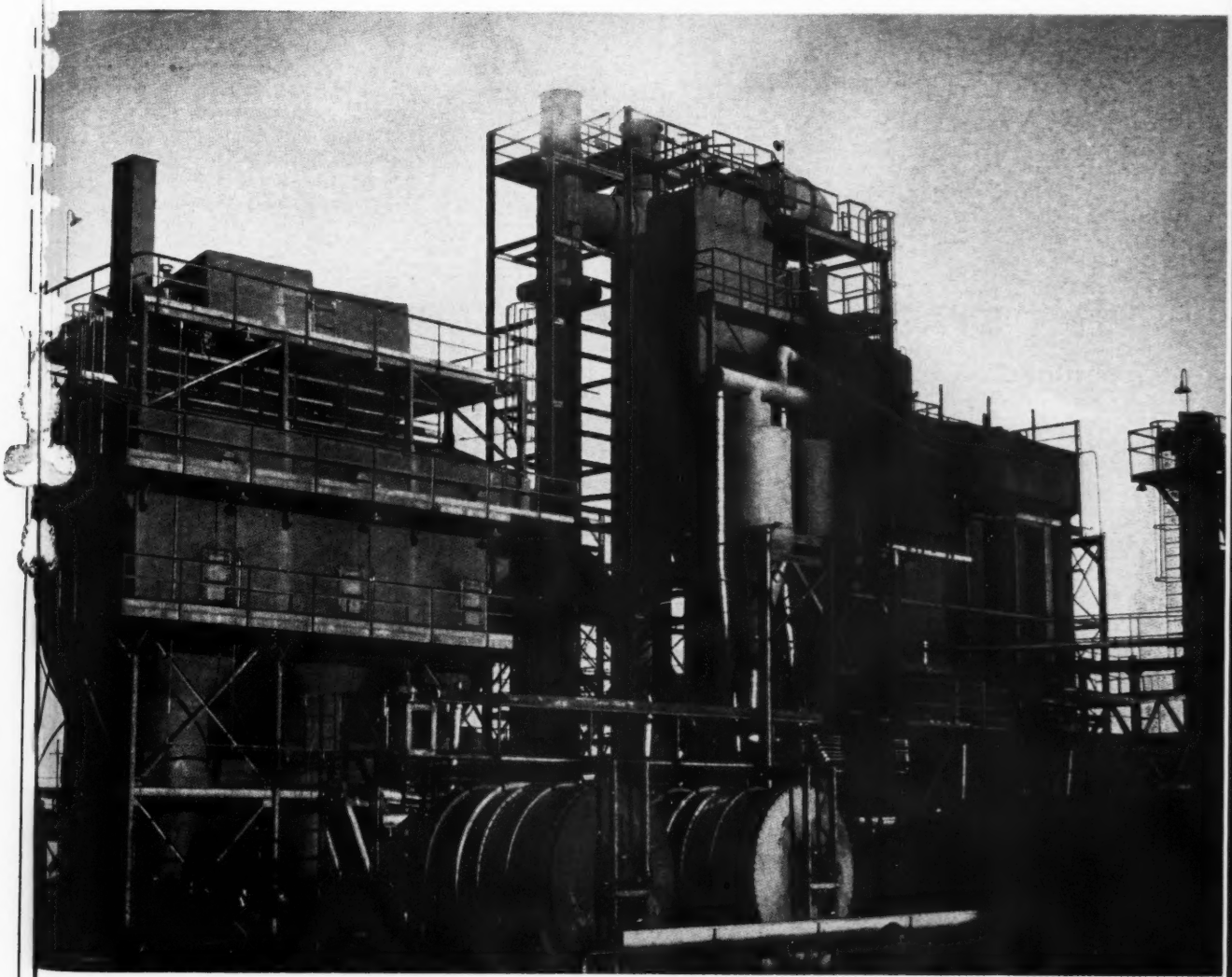

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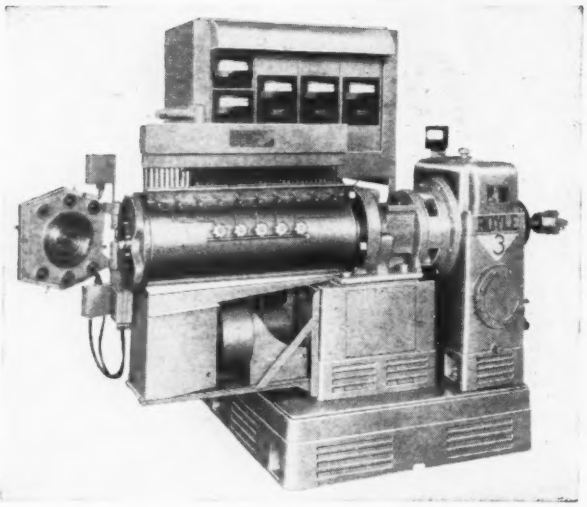

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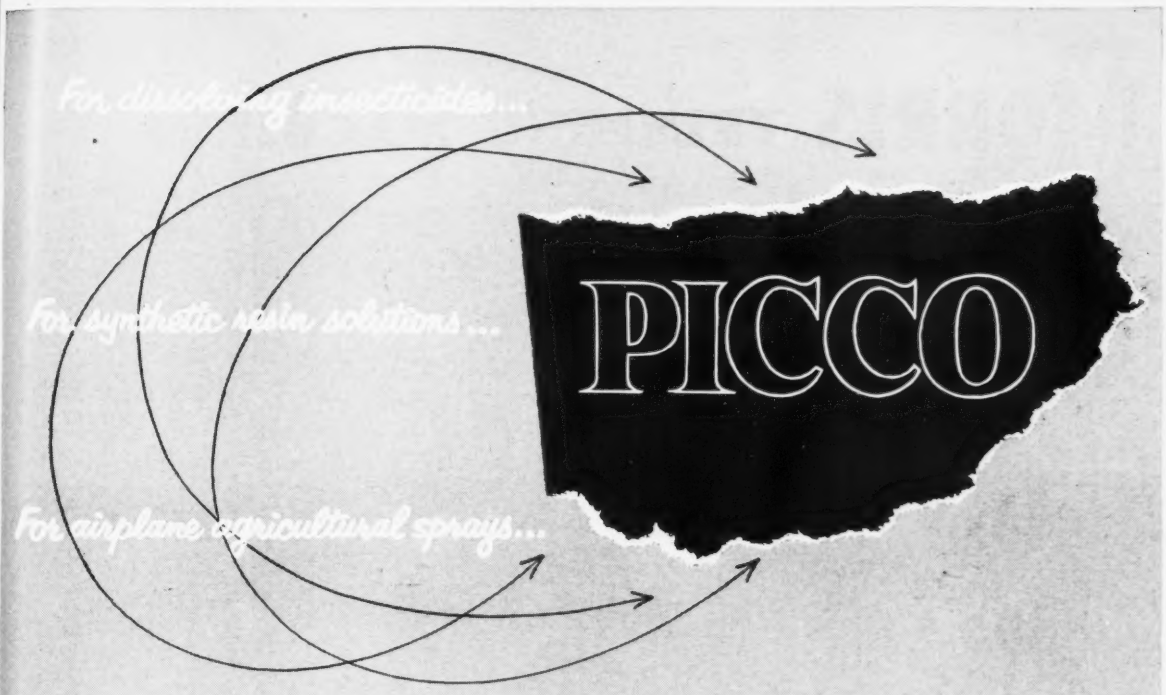

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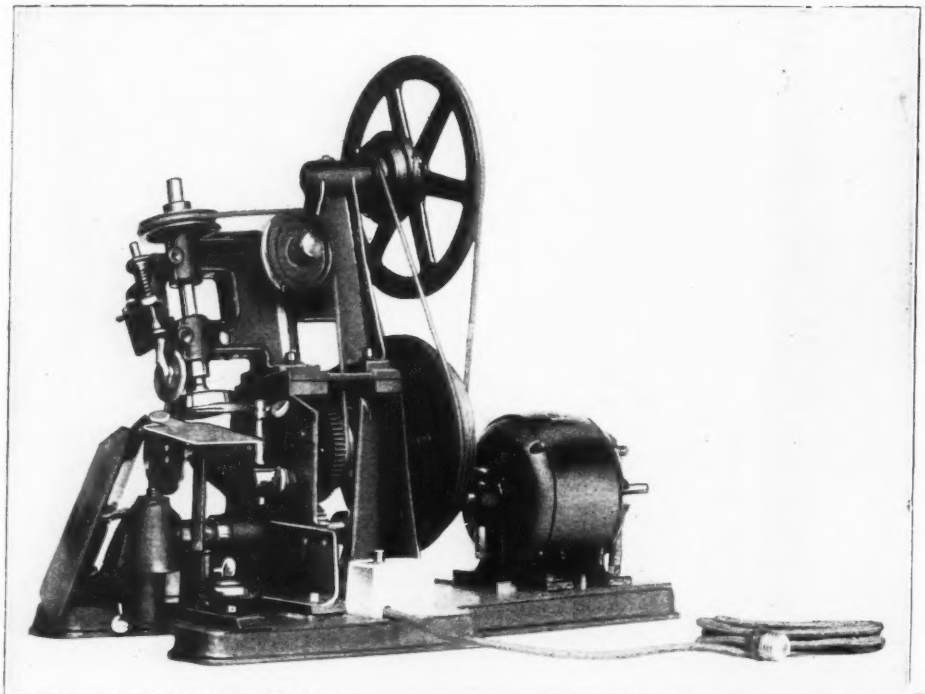

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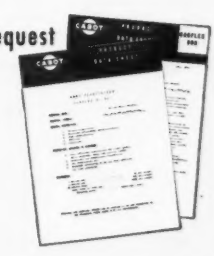

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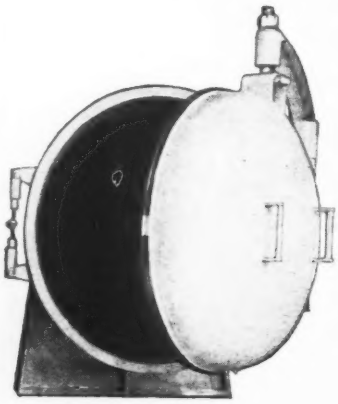

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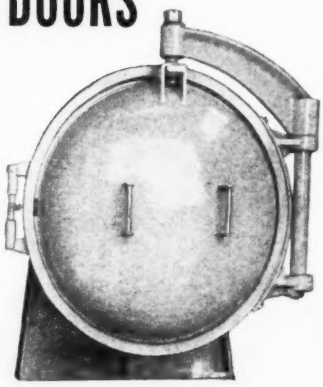

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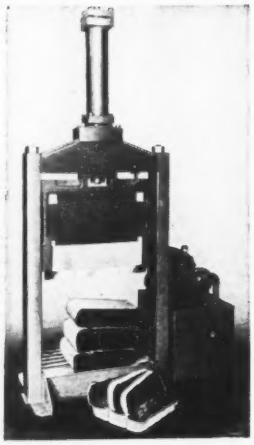

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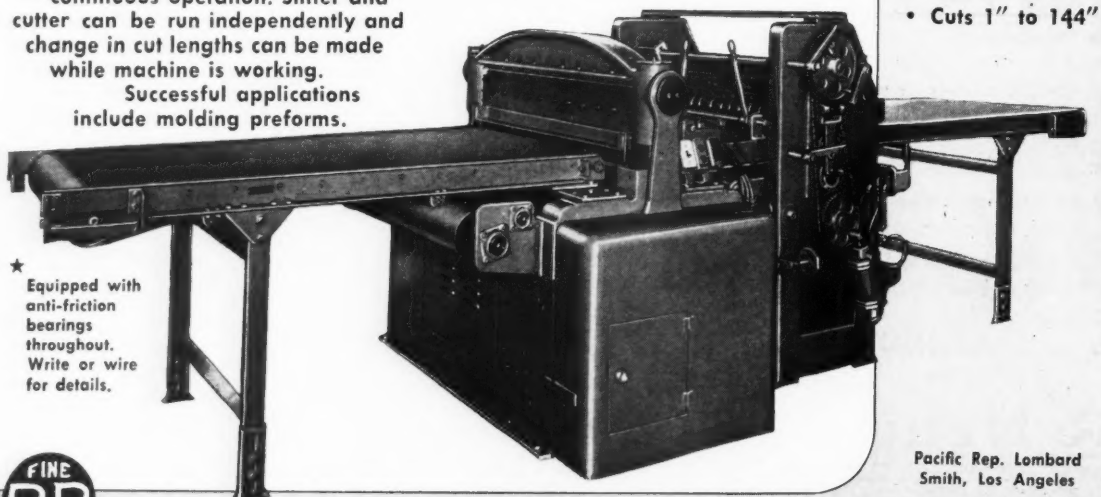

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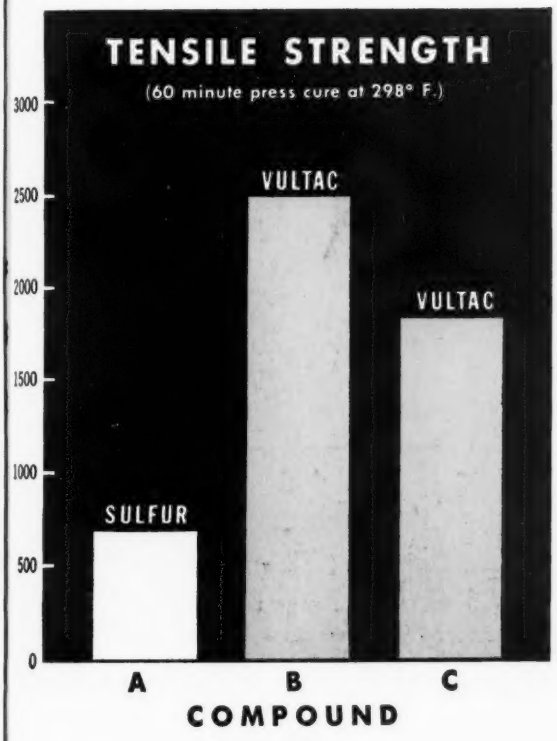
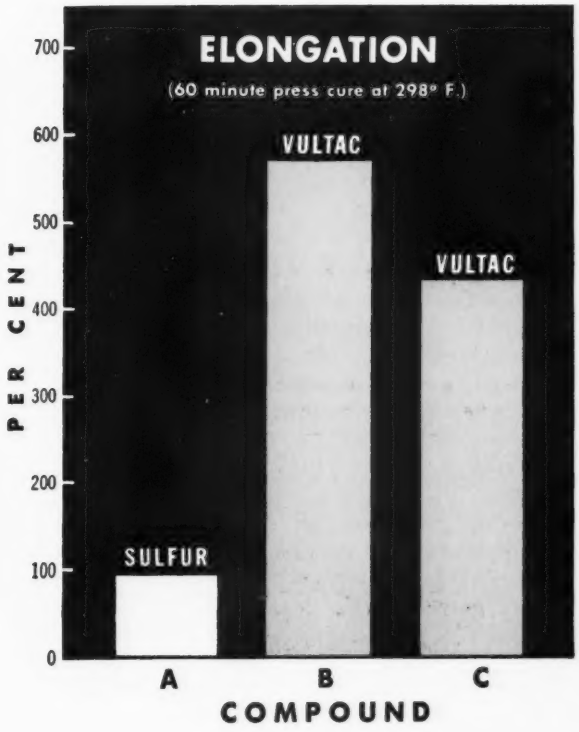
ETHYLAC	1	1	1
Sulfur	20	—	—
VULTAC #3	—	40	60
Total	192	212	232





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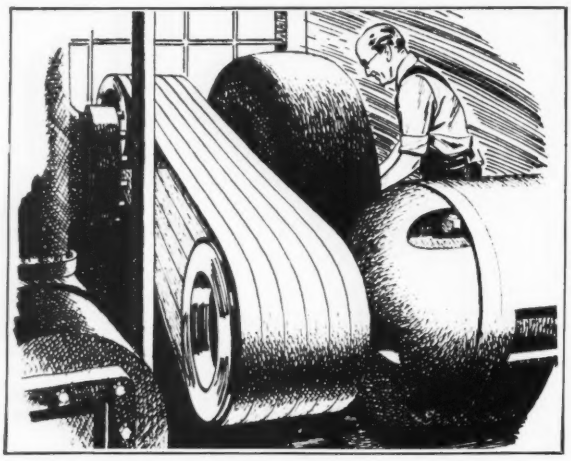

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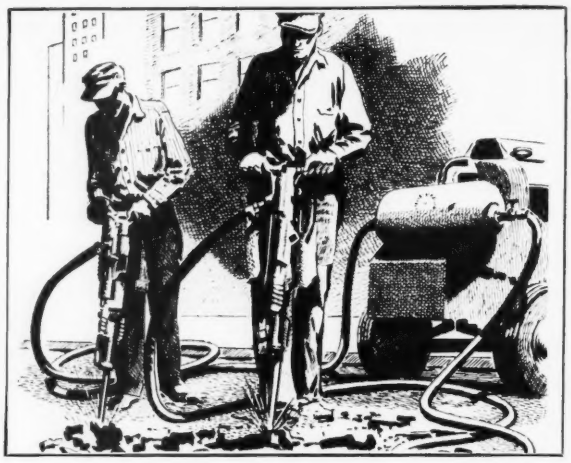

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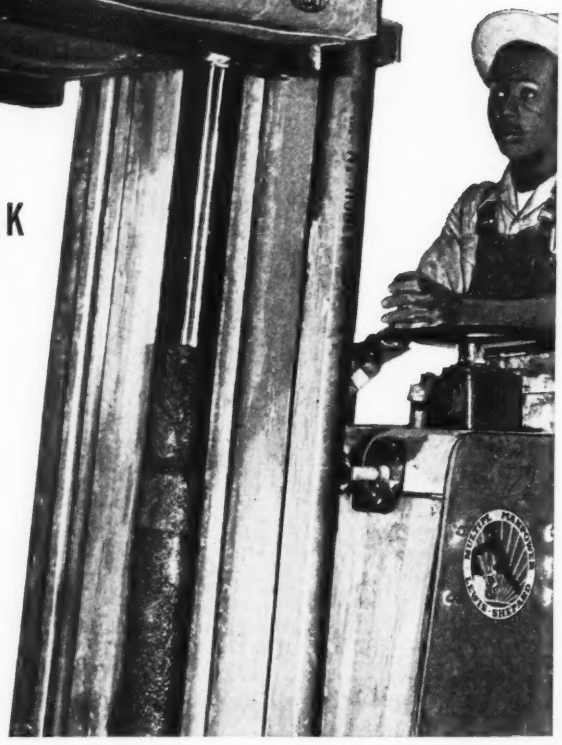

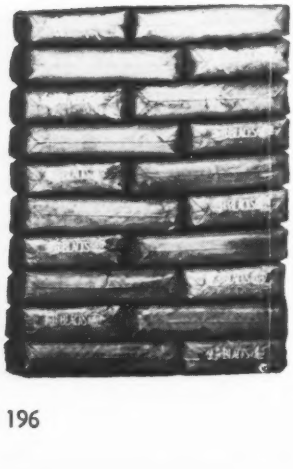

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WORLD
VOL. 129—NO. 2 NOVEMBER, 1953

Active Carbons as Anti-Stain Agents for Reclaimed Rubber[1]

J. J. Keilen[2] and W. K. Dougherty[2]

THE use of reclaimed rubber by the rubber industry itself has been of importance since the invention of vulcanization more than 100 years ago. The resulting technical advantages to be gained in processing and in the improved properties of the resulting products have been shown by many investigators. Reclaimed rubber has also been an important economic factor in controlling prices of crude natural rubber.

The ways in which rubber reclaim helps in the manufacture of rubber goods have been described many times in the literature and are well known.[3] Yet this raw material, like others, has limitations which the reclaiming industry is continuously striving to overcome. New reclaiming processes and new materials are evaluated with the expectation of furnishing better and cheaper products for the consumer.

One of the important fields of investigation in recent years has been the production of reclaimed rubbers for use where light and bright colors are desired. A part of the reclaimed rubber produced is brown or red, but with tires supplying the bulk of the raw material, the quantity of colored reclaim is obviously limited. How, then, can the producer of light-colored goods take advantage of the desirable properties obtainable from reclaim? One apparent answer is to use a black compound, as the main body of the article, and to apply an outer layer or coating of light color. We are all familiar with this practice in the manufacture of white sidewall tires.

Even this device is not a complete answer to the problem. Reclaimed rubbers contain certain components of the original compound, such as accelerators and antioxidants, which are soluble in rubber and which migrate into the light-colored layer, causing discoloration or staining. Some oils used in the reclaiming processes likewise migrate and cause staining. Some of these materials are not initially dark-colored, but develop coloration on exposure to light, especially sunlight.

Although non-staining compounding chemicals are available to the rubber industry, these are considerably more expensive than the staining type, and, therefore, are not widely used. Only a small amount of the scrap rubber available to the reclaimer contains only the non-staining chemicals. Thus the bulk of the reclaim made is of the staining type.

It was mentioned above that the staining chemicals migrate from the main body of the rubber article into the light-colored layer. If the migration were to be eliminated or its rate reduced sufficiently, then the discoloration would not take place where it matters, on the surface. Active carbon is a material which can be added to the

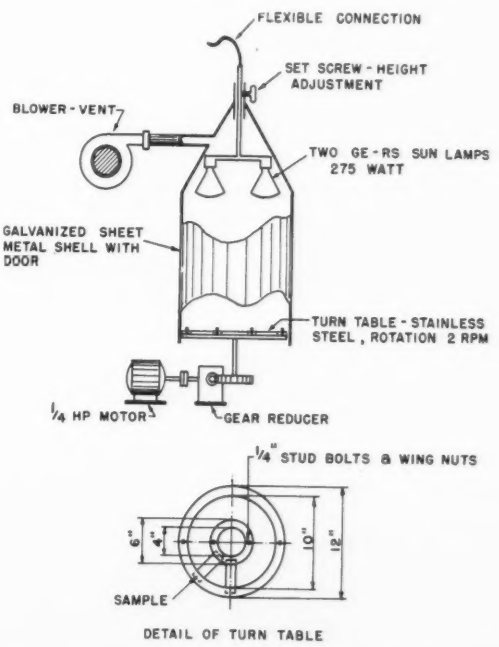


Fig. 1. Exposure Device for Determining Discoloration and Staining of Rubber

[1] Presented before the Division of Rubber Chemistry, A. C. S., Buffalo, N. Y., Oct. 29, 1952.
[2] West Virginia Pulp & Paper Co., Charleston, S. C.
[3] "Reclaimed Rubber," J. M. Ball. Rubber Reclaimers Assn., New York (1947).

reclaim rubber to minimize such migration. It has an affinity or adsorptive capacity for the complex organic chemicals that cause staining, and thus prevents the migration.

Many forms of carbon exhibit some degree of activity. The carbon blacks that are widely used in the rubber industry have a slight adsorptive power. Charcoal has been known and used for many years as an effective adsorbent. Bone black has long been used by the sugar industry for its adsorptive power. Today, however, the most effective active carbons are those derived from various carbonaceous materials. They are designed and selected for specific jobs in industry. A number of different grades are available, depending on the raw materials and processes used in the manufacturing operations. Prices also vary widely.

Active Carbon

The first step in the manufacture of an active carbon[4,5] is carbonization of the raw material, usually in the absence of air. Volatile components and gases formed are distilled off, giving a porous product known as a char. This char generally has some adsorptive capacity which is further increased by activation processes. Activation gives still greater porosity and greater surface area, accompanied by a loss in weight. This latter factor accounts for much of the greater cost of the most powerful adsorbents.

Although many of the properties of an active carbon are dependent on the raw material, it is possible to modify both the degree and the type of activity by suitable control of conditions of carbonization and the type of activation used. It is thus apparent that a wide variety of carbons could be used for anti-stain agents in reclaimed rubber. Many of these can be eliminated from consideration immediately because of price.

The present study deals entirely with several different active carbons derived from the same raw material, the waste liquor resulting from pulping wood by an alkaline process.[6] These carbons were originally divided into two main types, one for removing color bodies; the other for removing tastes and odors. With the development of many varied uses, such designations are no longer accurate. The carbons in the present study are classed as Type A for the original decolorizing grade, and Type B for the taste and odor grade. All are soft, powdered, amorphous products in contrast to some other active carbons which are hard and granular.

Several methods have been suggested in the literature for using active carbon to prevent staining by reclaimed rubber. The earliest method inserted a buffer layer between the white sidewall and the carcass of a tire.[7] In another method, active carbon is added with other reclaiming chemicals to the scrap rubber before cooking.[8] Current preferred practice is to add the active carbon either on a roll mill or in a Banbury mixer to reclaim which is otherwise treated in the usual way. For this laboratory investigation the active carbons were milled into the reclaim on a laboratory roll mill.

Several different test methods are used in the rubber industry for evaluating the anti-stain action of active carbons. In one of these, which closely simulates the actual application in white sidewall tires, a white and a black compound are made up from crude rubber. A staining-type antioxidant and various amounts of active carbon are added to portions of the black compound. Strips about 7/16-inch thick are placed into a ½-inch deep mold; then a sheet of the white compound about 1/16-inch thick is placed over them. The combination is cured, and the resulting slab is exposed to direct sunlight. Visual comparisons of the staining can be made easily by this method.

Another test method which approximates the application of reclaimed rubber in floor mats utilizes a basic black reclaimed rubber stock. Cured samples with and without active carbon are coated with a standard gray rubber cement and exposed to ultra-violet light in a Fadeometer or similar device. The resulting colors are compared visually.

The American Society for Testing Materials Method D925-47T uses rubber specimens in contact with metal panels coated with organic finishes. This method is not considered adequate because it does not expose the finish in contact with the rubber specimen to the action of the light source.

A fourth method uses cured reclaimed rubber as a base stock, but with the addition of only sulfur as a curing chemical. Cured strips containing different types and amounts of active carbon are coated with a white lacquer and exposed to ultra-violet light for a given period. The brightnesses of the exposed strips are measured with a reflectometer. This method with several variations was used for most of the work described in this report, as will be described in more detail below.

Both natural rubber and GR-S whole tire reclaims were used in this investigation. A number of different active carbons were investigated. The results demonstrate the effects of pH, particle size, added moisture, iodine value, and molasses value of experimental grades of the carbons on their anti-stain activity. A series of commercial carbons was also tested.

Preparation of Reclaim Blends Containing Active Carbon

Samples of reclaimed rubber containing the active carbon were prepared on a six- by 12-inch two-roll laboratory mill. Two hundred grams of either all GR-S or mixtures of GR-S and natural rubber reclaim, were banded on the mill and blended for one minute. The desired quantity of active carbon was added and mixed over a period of five minutes. Ten grams of sulfur were mixed in over a two-minute period; then the compound was removed and passed through the mill 16 times without further banding. Slabs were cured between cellophane in a six- by six- by 0.075-inch mold for 40 minutes at 40 psi. steam pressure. Upon removal from the mold, the slabs were cooled in water, and the cellophane was stripped off. Three strips measuring one inch by four inches were cut from each slab and allowed to hang overnight to permit gassing.

Coating, Exposing, and Measuring Samples

The lacquer used for coating the strips was Body White High Gloss Lacquer DHL-8000.[9] To minimize variations from can to can and also during use, several gallons of lacquer were thoroughly blended and then put into tightly sealed small jars. A fresh jar was used each day. The strips were dipped into the lacquer, then hung up to dry for one hour.

The coated strips were placed into the exposure device, illustrated in Figure 1, to accelerate discoloration. It might be pointed out that this unit was constructed so

[4] "Active Carbon," J. W. Hassler. Chemical Publishing Co., New York (1951).

[5] "Active Carbon—The Modern Purifier," J. W. Hassler, West Virginia Pulp & Paper Co. (1941).

[6] Nuchar, industrial chemical sales division, West Virginia Pulp & Paper Co.

[7] United States patent No. 2,240,855, W. E. Phillips (May 6, 1941).

[8] U. S. patent No. 2,278,826, A. D. Costello and H. L. Dixon (Apr. 7, 1942).

[9] Ditzler color division, Pittsburgh Plate Glass Co., Pittsburgh, Pa.

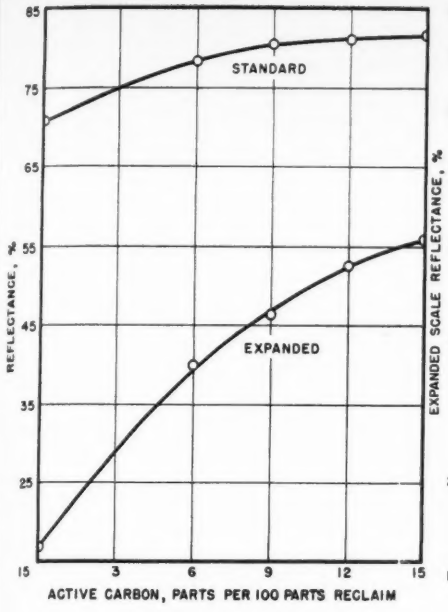


Fig. 2. Comparison of Reflectance Values on Standard and Expanded Scales

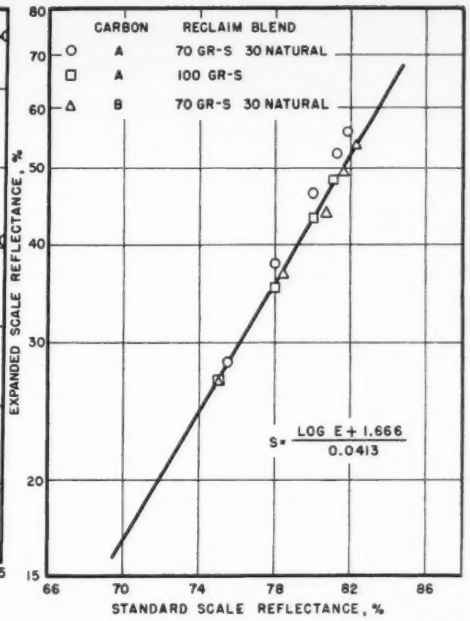


Fig. 3. Relation between Reflectance Values on Standard and Expanded Scales

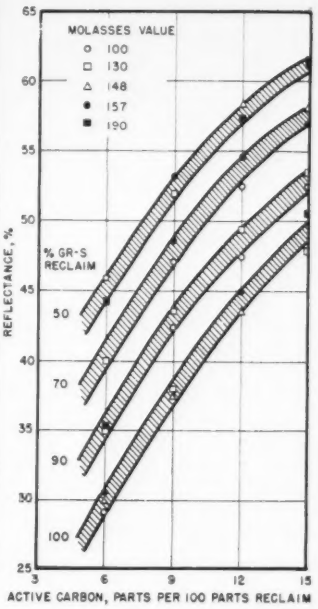


Fig. 4. Anti-Stain Activity of Active Carbons of Different Molasses Values in Reclaimed Rubber

that the center of the sun lamps was directly over the center of the exposed portions of the test strips. By using a Photovolt reflection meter, Model 610, the brightnesses of the samples were measured within 10 minutes after removal from the exposure device. Three reflectance readings were taken on each strip; so each reported value represents an average of nine separate readings.

In preliminary experiments of discoloration an exposure time of 20 minutes was used. The reflectance meter was calibrated, using a magnesium carbonate block as 100% brightness. The results obtained were somewhat erratic. The values found in some cases failed to differentiate between various quantities of the active carbons, owing to inability to secure accurate readings on the meter scale.

Two revisions in the procedure largely overcame this difficulty. The exposure time was lengthened from 20 minutes to one hour, thus intensifying the staining. The reflectance meter was recalibrated, still using the magnesium carbonate block as 100% reflectance, but setting the scale of the meter to read 50% reflectance on a standard gray enamel disk which on the other scale gave 75% reflectance. These revisions gave a wider spread between reflectance values so that reading inaccuracies were minimized. Since the 20-minute exposure and standard meter scale have been used in the past, it was necessary to show the relation between the readings of this scale and those of the expanded scale and longer exposure time. This was determined by plotting on rectangular coordinates the values of both scales for several different active carbons. A typical plot of these values is given in Figure 2. In Figure 3 the values on the standard scale plotted on semi-logarithmic coordinates against those for the expanded scale give a straight line function. This relation is expressed mathematically:

$$S = \frac{\log E + 1.666}{0.0413}$$

where S = value using 20-minute exposure and standard reflectance meter scale.

E = value using 60-minute exposure and expanded reflectance meter scale.

Type A Carbons

As mentioned earlier, there are two major types of active carbon. Within each type are variations in activity. A common indirect test used for measuring the activity of Type A carbons results in molasses value. The procedure is described and discussed by Hassler;[4,5] so let it suffice here to say that higher molasses values represent greater decolorizing activity in the carbon. In order to investigate the effect of this type of activity in reclaimed rubber, a series of active carbons which differed only in molasses value was tested.

Active carbons having molasses values of 100 to 190 were selected. Much higher molasses values are available, but these fall into the high-price category; so they were omitted. Each carbon was added to four different blends of GR-S and natural rubber reclaims in loadings 6, 9, 12, and 15 parts by weight per 100 parts of the reclaim. The averaged readings were plotted as % reflectance against active carbon loading, as shown in Figure 4. For simplicity, only the extreme points are shown, but these are sufficient to indicate that the type of carbon activity measured by molasses value does not play much of a role in anti-stain action in reclaimed rubber.

Figure 4 demonstrates forcibly the more serious staining problem encountered with GR-S reclaim, as compared with natural rubber reclaim. This point is further brought out in Figure 5, in which the quantities of active carbon required to give reflectance values of 40 and 45% are plotted against % natural rubber reclaim in the blends. To achieve the same anti-stain effect, a 100% GR-S reclaim would require twice as much active carbon as a 50% blend of natural rubber and GR-S reclaims. Similar curves for any required reflectance or anti-stain power can be derived from Figure 4.

Type B Carbons

Within the group of active carbons usually designated as useful for removal of tastes and odors, activity is often measured by the iodine test. The iodine value of an active carbon is the % iodine removed from a standard solution

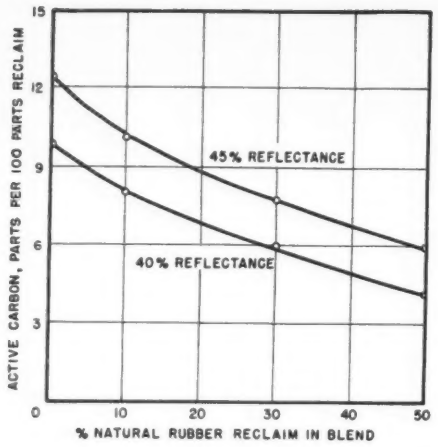


Fig. 5. Effect of Natural Rubber Reclaim in Blend on Active Carbon Requirements

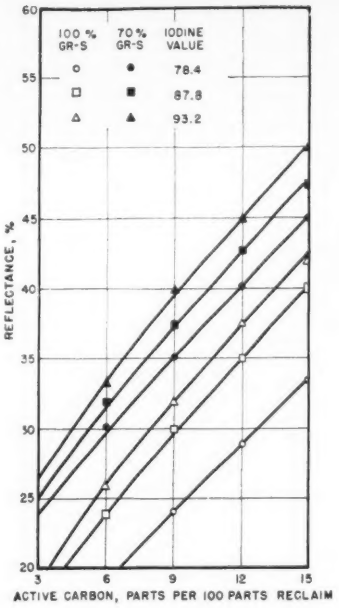


Fig. 6. Reflectance Values of Rubber Reclaim Blends with Active Carbons of Different Iodine Values

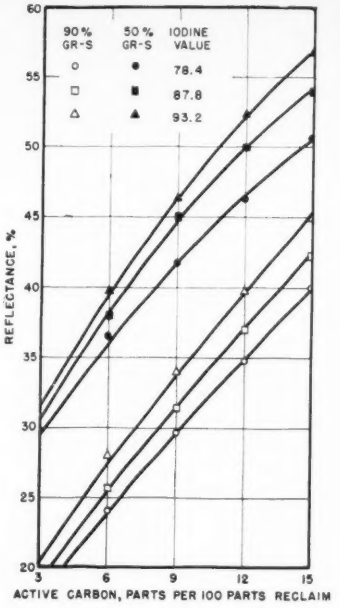
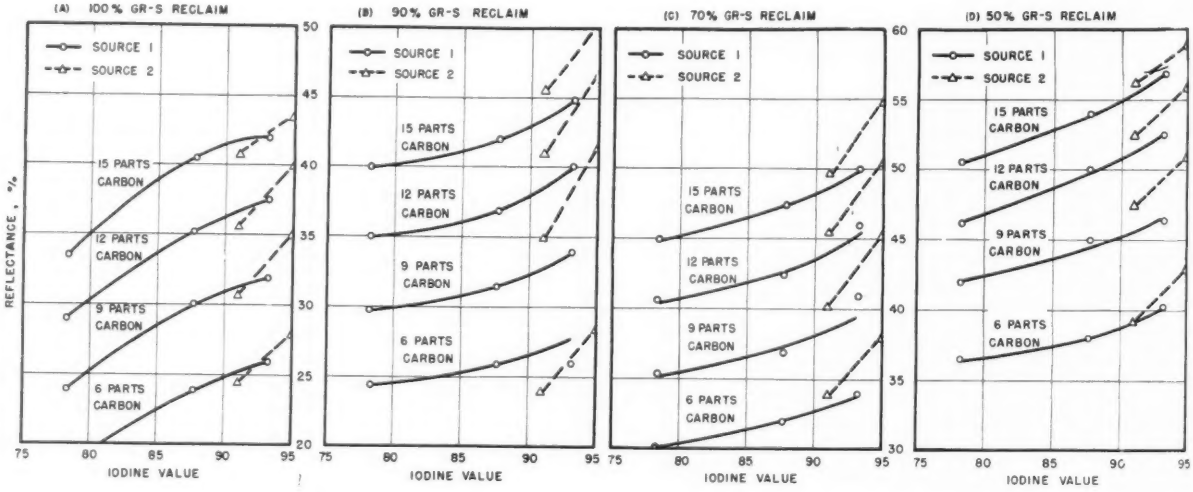


Fig. 7. Reflectance Values of Rubber Reclaim Blends with Active Carbons of Different Iodine Values

Fig. 8. Relation between Anti-Stain Activity and Iodine Value (A), (B), (C), and (D)



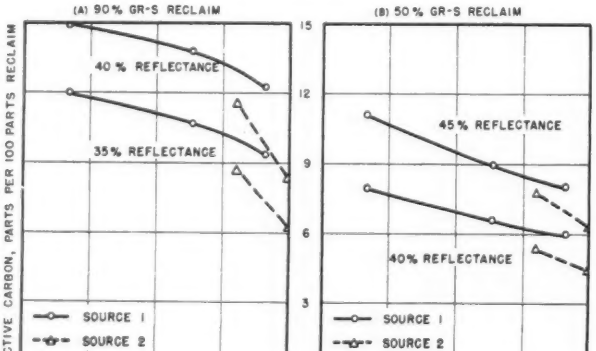


Fig. 9. Effect of Iodine Value on Active Carbon Requirements (A) and (B)

by 0.4-gram of the carbon. The test is described in detail by Hassler.[4,5]

Three active carbons from one source and two from another, each having a different iodine value, were used in this study to determine the effect of iodine value on the anti-stain properties of the carbon. Each carbon in four loadings was evaluated in the four blends of natural rubber and GR-S reclaims.

The averaged reflectance readings are plotted in two graphs, Figures 6 and 7, to avoid confusion caused by too many points and lines in close proximity. It is easily seen that the anti-stain activity of the carbons, as evidenced by the reflectance values, is related to the iodine values, with the higher iodine values being more active. This point is shown further in Figure 8, which contains curves of % reflectance plotted against iodine value for both sources of the active carbon. The reason for the change in the shape of the curves with the addition of natural rubber reclaim to the blend is not known at this time.

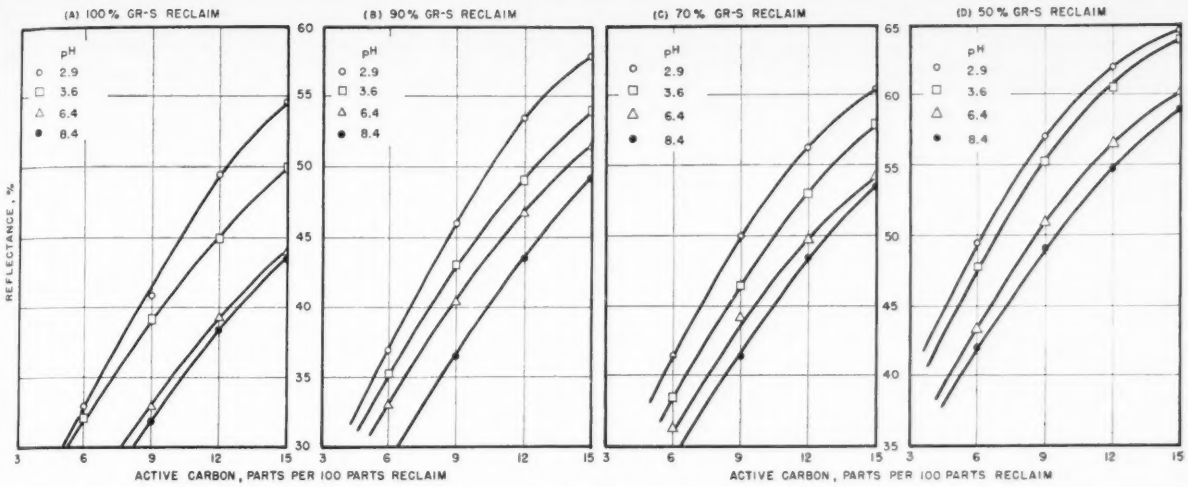


Fig. 10. Reflectance Values of Rubber Reclaim Blends with Active Carbons of Different pH Values (A), (B), (C), and (D)

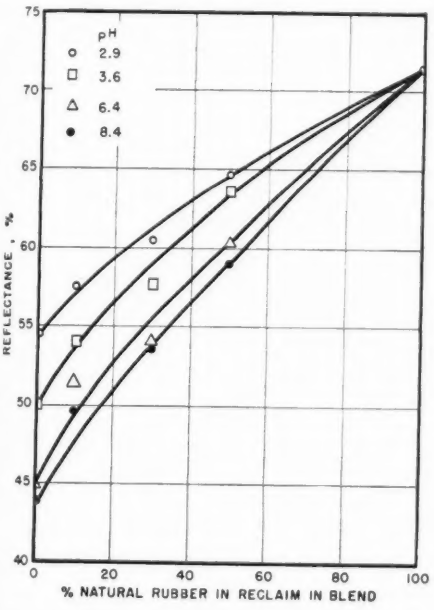


Fig. 11. Relation between Natural Rubber Content of Reclaimed Blends and Anti-Stain Activity of Carbons of Different pH Values

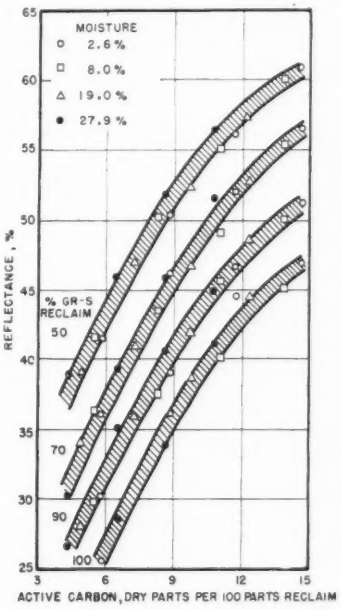


Fig. 12. Anti-Stain Activity of Active Carbons of Different Moisture Contents in Reclaimed Rubber

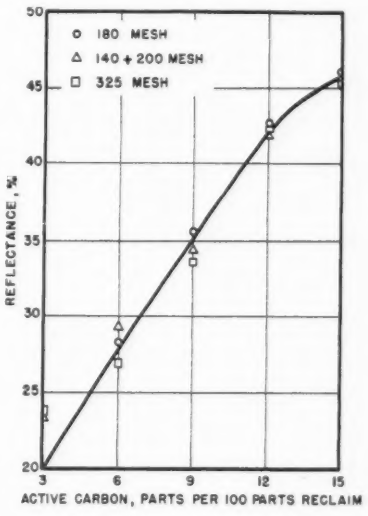


Fig. 13. Anti-Stain Activity of Carbons of Different Mesh Size in GR-S Reclaim

It is possible to show the effect of the ratio of natural rubber and GR-S reclaims on the amount of Type B active carbon required to secure a given anti-stain activity, as was done with the Type A carbons. It probably is of more interest, however, to show how the iodine value is related to the amount of carbon required for one reclaim blend and several reflectance values. Samples of such derived curves are given in Figure 9. Families of curves can be drawn for each of the blends of the two reclaims.

It is seen that an increase in iodine value from 78 to 93 reduces the amount of active carbon required for a given anti-stain activity by about three parts per 100 parts of the reclaimed rubber blend, or approximately 25%. Here again a change in shape of the curves is noted. It is possible that minor variations in another property, such as pH, cause the deviations from straight lines.

pH of the Active Carbon

The pH of an active carbon is known to be a factor in its adsorptive activity in some applications. The pH is measured on a suspension of two grams of carbon in 50 milliliters of distilled water. It is possible to adjust the pH with mineral acid during the manufacturing operations in order to attain the desired value. Any carbon, regardless of its fundamental type, can be so adjusted. For these reasons, pH was made the subject of a series of tests in which all other properties of the carbon were kept constant. The same blends of GR-S and natural rubber reclaims, and the same active carbon loadings were used as in the experiments described above.

The basic reflectance data for active carbons of different pH values are plotted in Figure 10 for the different blends and different carbon loadings. From these curves it is quite readily seen that active carbons of low pH have greater anti-stain activity than those of high pH.

Preliminary plots of reflectance *versus* pH of the carbon and reflectance *versus* % natural rubber in the reclaim blends indicated that as the natural rubber was in-

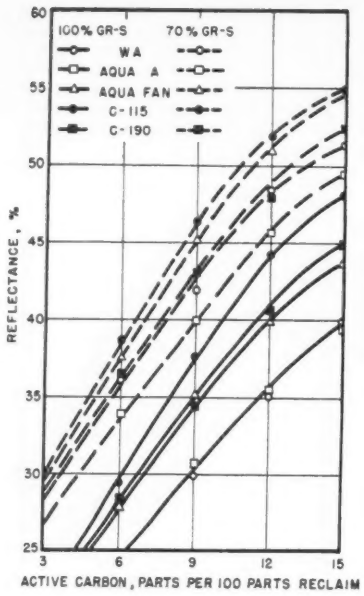


Fig. 14. Anti-Stain Activity of Commercial Grades of Active Carbon in Reclaimed Rubber

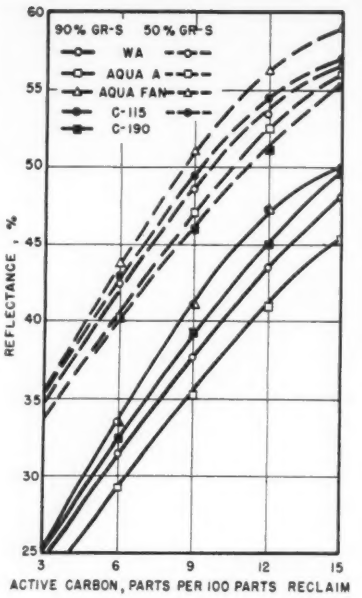


Fig. 15. Anti-Stain Activity of Commercial Grades of Active Carbon in Reclaimed Rubber

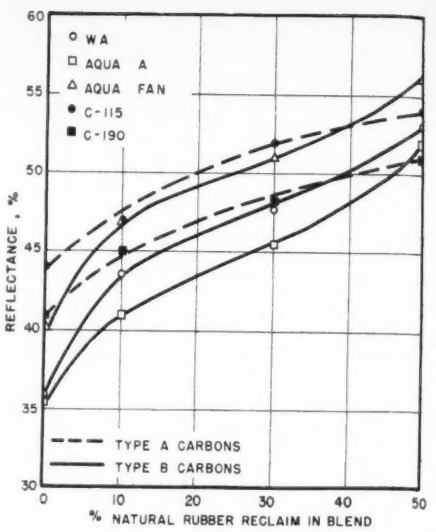


Fig. 16. Effect of National Rubber Reclaim in Blend on Anti-Stain Activity of Commercial Carbons at 12 Parts Loading

creased, the effect of pH was reduced. To demonstrate this point further the different carbons were tested in 100% natural rubber reclaim. When 15 parts of the carbons per 100 parts of the reclaimed natural rubber were used, a reflectance value of 71.5% was obtained for all of the carbons in the pH study. A graphical representation of this is given in Figure 11.

It would be possible to show the effect of pH of the active carbons on quantities required to secure given brightnesses, but such derivations would not be of too great significance. The pH of an aqueous extract of the GR-S reclaim was 6.1. An extract of the natural rubber reclaim had a pH of 8.1. It must be realized that the pH of the compound in which the anti-stain reclaimed rubber is used probably is different from that of the reclaim itself. It is likewise possible that the pH of the compound independently of the pH of the reclaim would influence the staining due to the reclaim, since colors of chemicals such as the antioxidants are often influenced by pH.

Moisture in Active Carbon

As is true with other lightweight dry pigments, the addition of active carbon to rubber in a Banbury mixer or on a roll mill presents a dusting problem. Active carbon, like carbon black, is worse than many other pigments because of its light weight and the dirt that it creates. One means for partially overcoming this feature is moisturizing, or the addition of water to the carbon before the mixing.

No previous information was available on the effect of moisture on anti-stain activity. It was thought that it could have a beneficial effect, could be merely an inert ingredient, or possibly could even be harmful since it would be introducing water into a largely hydrocarbon system. A large sample of one active carbon was divided into four portions, and a different amount of water was added to each. The four moisturized active carbons were tested in the four reclaim blends at loadings of 6, 9, 12, and 15 parts per 100 parts of reclaimed rubber.

The results of this series of tests are given in Figure 12. The quantities of carbon used in the plots are dry weights; so it is concluded that added water has very little, if any, effect on the anti-stain activity of the carbon, other than being an inert diluent. The presence of the solid points generally in the upper portions of the bands might be an indication of some favorable action of the water, but if so, the magnitude of the effect is not appreciable.

Particle Size of the Active Carbon

Particle size of active carbon is a factor in many of its applications. In the treatment of municipal water supplies for taste and odor control, fine particle size is desired to get the low dosage well distributed; in some industrial applications, larger particle size is used to secure rapid filtration. It was thought that fine particle size would be advantageous for the active carbon in reclaimed rubber. At the same time it was recognized that possible particle breakdown of the friable active carbon during the milling operation could obviate any original particle size classification.

Commercial grades of active carbon, as might be expected, contain a range of particle sizes, and different grinds result largely in redistribution of particle sizes. To put particle size tests on a sound basis, a sample of one active carbon was sieved, and then three of the fractions were tested, using GR-S reclaim and five loadings of the carbons. The graph in Figure 13 shows that mesh size has no effect on the anti-stain activity of the carbon, indicating the likelihood of particle breakdown during milling.

Commercial Grades of Active Carbon

As a final series of tests, five commercial grades of active carbon[10] were compared in anti-stain activity. With these carbons no attempt is made to correlate any of their physical properties. Two of them are Type A and three are Type B. The four blends of GR-S and natural rubber reclaims and the four loadings of active carbon were used. The basic data are in Figures 14 and 15.

Comparisons of the effectiveness of commercial carbons for anti-stain activity in various blends of natural rubber and GR-S reclaims, as determined by test reflectance,

[10] Industrial chemical sales division, West Virginia Pulp & Paper Co.

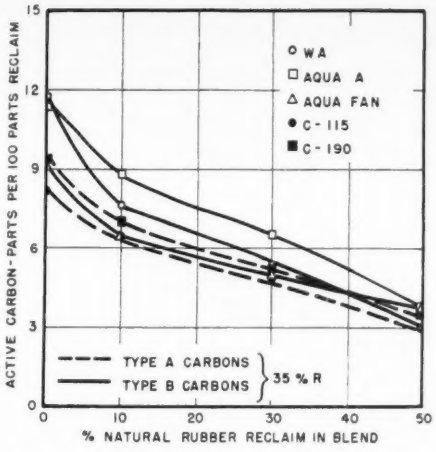


Fig. 17. Effect of Natural Rubber Reclaim in Blend on Commercial Active Carbon Requirements for 35% Reflectance

may be expressed in a variety of ways. Figure 16 shows the change in reflectance with changes in the natural rubber reclaim and GR-S reclaim proportions; similar plots can be derived from the basic curves for any loading desired. Figure 17 shows the effect of the blend on the quantities of active carbon required to achieve a test reflectance of 35; a complete family of such curves can be drawn for any carbon. It is interesting to note from both graphs that the curves for the Type A carbons are roughly parallel; that the curves for the Type B carbons are roughly parallel; but that the two groups do not parallel each other. For obtaining a reflectance of 35 with 50% GR-S reclaim and 50% natural rubber reclaim, all five carbons are nearly equal in quality. With no natural rubber reclaim in the blend, the best of the Type B carbons is equivalent to the poorer of the Type A carbons.

Specific Gravity of Active Carbon in Rubber

As with any other ingredient going into rubber compounding, the specific gravity of active carbon is of some importance. Attempts have been made to determine specific gravity by the displacement method, only to find that the value depends on the liquid being used.[5] Since active carbon contains many capillary pores, it seemed unlikely that any particular liquid would give a value suitable for use with a viscous material such as rubber. Accordingly, rubber compounds were prepared, using known ingredients and known quantities of several carbons of widely varying bulk density. The compounds were cured, and specific gravities determined by water displacement. By back calculating it was found that all of the active carbons tested had apparent specific gravities between 1.43 and 1.47. It is suggested, therefore, that an average value of 1.45 be used for the specific gravity of active carbon in rubber compounding.

Active Carbon and Mooney Viscosity

One of the problems arising in the use of active carbon in reclaimed rubber is the effect on processing characteristics. Since this could dictate the selection of the grade of carbon for anti-stain activity, Mooney viscosities were run for carbons of three different mesh sizes in GR-S reclaim and of one mesh size in natural rubber reclaim. The standard ASTM D927-47T procedure was used, with a temperature of 212° F.[11] The test results are given in Table 1.

[11] "Standards on Rubber Products," American Society for Testing Materials, 1916 Race St., Philadelphia, Pa.

TABLE 1. MOONEY VISCOSITIES OF RECLAIMED RUBBERS CONTAINING ACTIVE CARBONS OF DIFFERENT SIZES

Reclaim	Active Carbon Mesh	Mooney Viscosity, ML-4, for Carbon Loadings, Parts Per 100 Parts Reclaim					
		0	3	6	9	12	15
GR-S	+80	55	62	72	84	92	104
	−140 +200	55	64	73	82	92	102
	−325	56	64	73	85	93	107
Natural	−325	51	64	65	76	87	90

Conclusions

Based on this work, the following conclusions are drawn regarding the use of active carbons as anti-stain agents in GR-S and natural rubber reclaim blends.

1. Molasses value, frequently used as a measure of activity of Type A carbons for decolorizing, has no effect on anti-stain activity.

2. The anti-stain activity of Type B carbons increases with iodine value, a criterion of the ability of the carbon to remove tastes and odors from water.

3. Acidic carbons are more effective in GR-S reclaim than are alkaline carbons. The effect of pH of the carbon in natural rubber reclaim is negligible.

4. Moisture in active carbon up to 28% has very little, if any, effect in blends containing up to 50% natural rubber reclaim.

5. Particle size, as measured by sieve analysis, has no effect on anti-stain activity or Mooney viscosity.

6. Commercial grades of Type A carbons are more effective in GR-S reclaim than commercial grades of Type B carbons. There is little difference in the two types in a blend of 50% GR-S reclaim and 50% natural rubber reclaim.

7. The effective specific gravity of active carbon in rubber is 1.45.

Acknowledgment

The authors wish to express their appreciation for the advice received from several of the rubber reclaiming companies, and especially from W. G. Kirby, of United States Rubber Co., Naugatuck Chemical Division, Naugatuck, Conn. Thanks are also due R. L. Holmes, of Raybestos-Manhattan, Inc., for the use of the Mooney viscosimeter. Without the cooperation of our own plants and our active carbon research laboratory in supplying special samples, the investigation would not have been possible.

All-Plastic Garden Hose

A NEW all-plastic garden hose, claimed capable of being shut off at the nozzle without danger of bursting, has been introduced by Industrial Synthetics Corp., Garwood, N. J. The Supplex Standard Tuffy-Ply hose is reinforced with rayon cord and contains an inner jacket of vinyl plastic fused to the inner tube. This construction reportedly provides a hose weighing two-thirds less than a comparable rubber model and assures flexibility and kink resistance while providing great strength. An outer sheath of colored vinyl protects the hose against sun, oxidation, abrasion, and hard use. Connections are made by means of internally expanded heavy brass couplings. This plastic hose, which is sold with a 10-year guarantee, is claimed to deliver 50% more water than a rubber hose of the same bore.

Garden Hose Cross-Sectional View

Product and Mold Designing toward Lower Ultimate Cost[1]

J. K. Mason[2]

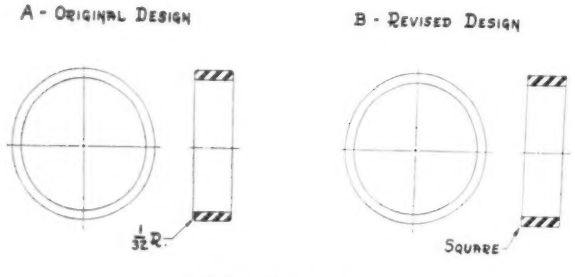


Fig. 1. Rubber Ring or Tire

THE engineer can make a real contribution toward more economical rubber goods mold and manufacturing costs if he will consciously make an effort to design toward the elimination of complicated and impractical features which add nothing to the intrinsic value of a part.

We appreciate that in the case of items destined for over the counter sale, sales appeal is a paramount factor, and this, to a certain degree, limits the opportunity for refinement. The engineer should not, however, feel hesitant about offering suggestions toward a more economical and functional design.

One of the most phenomenal current success stories is the results of one man's specialization in this field. That man is Raymond Loew. As a part of the Ford Foundation Television Show, "Omnibus," several months ago, Mr. Loew demonstrated examples of his work. Basically, he is successful because he has the ability to eliminate the ginger bread (complicated non-functional design) and still retain and enhance the sales appeal of a product.

We can't all be Loews, but we can and should make an effort to appropriate and apply his principles so far as is practical to the products we may have a hand in designing. By so doing, we can make a considerable contribution toward lower costs for our companies and savings for the ultimate consumer.

Examples of Reduction in Mold and Manufacturing Costs

We have some rather simple examples which demonstrate what can be done toward reducing mold and manufacturing costs of mechanical rubber goods if we consciously make an effort to eliminate non-essential expensive and complicating features.

Our first example is a rubber ring or tire (see Figure 1). This, as designed by the customer engineering department, has radii on the corners. Because of the radii, molding of the part was mandatory.

Although we had not been furnished with exact information as to how the part was to be used, we suspected that it was a tire for use on a clothes-dryer drum support and drive wheel. If our supposition was correct, we could see no reason why the radii were necessary. The customer was questioned. He confirmed that the part was a dryer drive-wheel tire and agreed that the radii were non-essential. The elimination of these radii resulted in the product being quoted as an extruded, mandrel cured, and cut item. The savings for the customer were: (1) cost of mold, $425.00; (2) savings on piece price, 45%.

While the monthly savings per piece may appear small and insignificant, such savings on high volume items obviously are desirable.

Figure 2 shows a body shim that is used in large quantities by one of the automobile manufacturers. The "A" design is that of the customer's engineering department. Note that the sides are perpendicular to the top and the base and that the metal insert must be adhered to the rubber section. While both of these features may be essential to similar parts used for other purposes, we did not feel they were necessary or desirable if they increased the cost of a simple body shim. View "B" shows a revised design. Note that two sides have been tapered, and the metal insert has been embedded slightly. Proposal drawings of the new design were submitted to the customer for his comments. No difficulty was experienced in obtaining approval because the new design did not change the functional characteristics of the product and gave the customer an equally satisfactory part at a reduced cost.

An analysis of the manufacturing specification for the two designs (see next page) clearly shows how the savings are made.

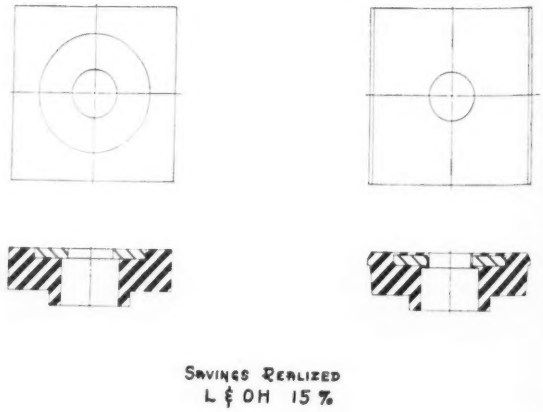


Fig. 2. Automobile Body Shim

[1]Presented before the Rubber & Plastics Division, ASME, Columbus, O., Apr. 29, 1953.

[2]Firestone Industrial Products Co., Noblesville, Ind.

BODY SHIM MANUFACTURING OPERATIONS

Design "A"	Design "B"
1. Prepare metal for adhesion (copper plate)	1. No preparation of metal necessary
2. Extrude and cut rubber preparation 1⅝- x 72-inch lengths	2. Extrude and cut rubber preparation 1⅝- x 32-inch lengths on automatic cutter
3. Cut rubber into 1⅝-inch lengths	3. Not required
4. Load mold	4. Load mold
a. Inserts	a. Inserts
b. Individual rubber preparation	b. Multiple-piece strip
5. Cure	5. Cure
6. Remove individual piece	6. Remove multiple-piece strip
7. Finishing	7. Finishing
a. Die trim	a. Dry ice tumble
8. Inspect and pack	8. Inspect and pack

The elimination of the metal preparation, the cutting of the individual piece preparation, reduction in mold loading time, and the change from the die cutting to dry ice tumble finish reduced manufacturing cost 15%. The change in mold design enabling the use of the multiple-piece strip preparation and the tumble finishing accounted for 12% of the savings.

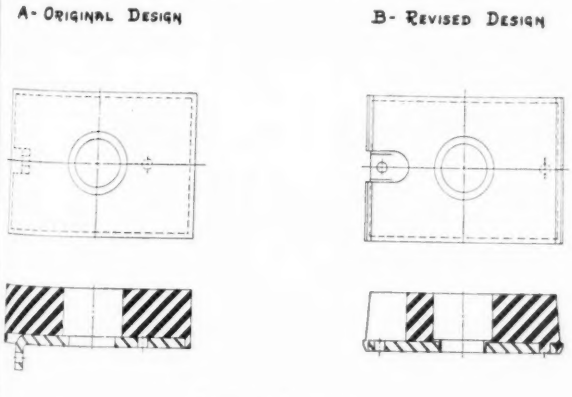
The mold for the part, as originally designed, would have been a conventional compression mold with the usual lands between cavities. If strip preparation were used with conventional land mold, the excess waste, to a great degree, offsets the labor savings. The solution of the problem is obvious—reduce the width of the land on two sides of the mold cavity so as to eliminate the waste.

How this was done is clearly shown by the section of Figure 2, View "B." The narrow knife-like land has no flush cavity. The parting line of the mold on these lands has been raised approximately $\frac{5}{32}$-inch so that the conventional lands on the opposite sides act as a guide and tend to center the strip preparation as the mold closes. All provision for flash is in the wide lands on two sides only and is less in volume than that which is customarily provided on all sides of the cavities of a conventional mold.

Figure 3, "A," shows a simple motor mounting or pad as designed by our customer. You will note that a metal locating and lock wire tab has been turned down from the base insert. Notice also that the ends are perpendicular to the base and the top. This design was refined as shown in "B."

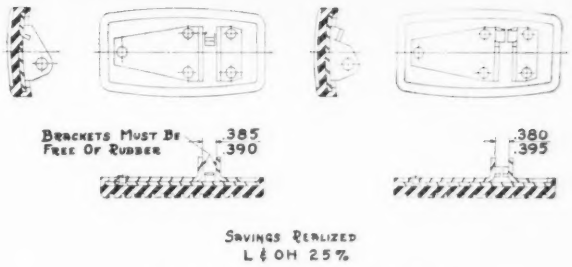
You will recognize that the mold design is basically the same as that used for the body shim. This allows the use of the economical strip preparation without excess waste and forms the parts so that they can be removed from the mold in multiple-piece strips.

The insert has been punched and scored so that the tab can be generated from either end. This practice simplifies loading of the inserts into the mold. Observe that the tab is punched to provide for the lock wire.



SAVINGS REALIZED
L & OH 12%

Fig. 3. Motor Mounting or Pad



SAVINGS REALIZED
L & OH 25%

Fig. 4. Clutch or Brake Lever Pad

You will note in the original design that the opening in the insert resulting from the tab being punched and formed would allow rubber to flow into the cavity provided for the tab. This condition would result in the tab being completely covered with rubber, and the lock wire hole would be filled. Since the part must be shipped with the hole free from any rubber, an extra operation would be necessary.

The part, as redesigned, eliminates this complication. A pin in each cavity enters the lock wire hole and prevents the closure of the opening by rubber.

The outline below compares the two designs from a factory specification and cost standpoint.

MOTOR MOUNT MANUFACTURING SPECIFICATIONS

Design "A"	Design "B"
1. Insert manufacture	1. Insert manufacture
a. Blank and pierce	a. Blank and pierce
b. Turn tab and cut off	b. Cut off
2. Metal preparation	2. Metal preparation
a. Degrease	a. Degrease
b. Anti-stick tab	b. Cement
c. Cement	Note—No anti-stick necessary
3. Rubber preparation	3. Rubber preparation
a. Extrude 1½- x 1½- x 72-inch lengths	a. Extrude 1½- x 1½- x 30-inch lengths
b. Cut 1½- x ½- x 2½-inch lengths	b. Cut automatically
4. Load mold	4. Load mold
a. Inserts	a. Inserts
b. Individual piece preparation	b. Strip preparation
5. Cure	5. Cure
6. Unload	6. Unload
a. Individual pieces	a. Multiple-piece strips
7. Finishing	7. Finishing
a. Die trim or tumble	a. Bend tab and cut apart
b. Buff rubber from tab and drill from lock wire hole	b. No drilling necessary
8. Inspect and pack	8. Inspect and pack

Prints of the proposed design were submitted to the customer's engineering and purchasing departments. The changes were accepted because they afford a savings in cost while in no way did they impair the functional characteristics of the part.

In Figure 4 we have a part that will be recognized as a simple clutch or brake lever pad. Although we would normally not expect to be confronted with impractical and costly designs in such a part, an examination of the original design disclosed certain features that made the part impossible to manufacture economically.

You will note in "A" that a stop has been formed from the main pad insert by piercing and bending a metal tab. This provided a satisfactory stop, but created a hole through the main pad insert that made rubberizing of the pedal uneconomical. The flow of rubber through this hole could not be completely prevented so that compliance with the tolerances for spacing of the brackets and the designer's note — "Brackets must be free of rubber" — was next to impossible.

"B" shows the parts as redesigned. The stop tabs have been generated from and are a part of the attachment brackets. With no hole through the main plate, the problem of rubber flow is eliminated so that compliance

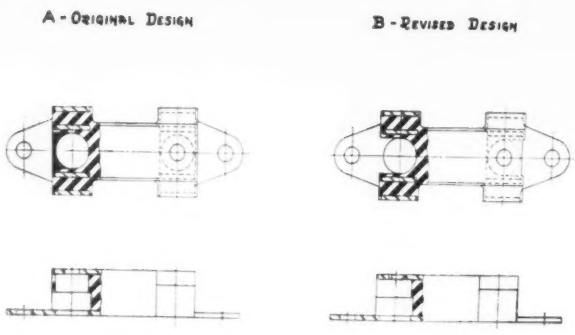


Fig. 5. Two-Plate Motor Mounting

with the designer's specification and tolerances are practical, and the pedal can be manufactured economically.

Proposal drawings of the new design were submitted to the customer and were accepted as soon as the reasons were made clear to the engineer who simply did not recognize the fact that when forming or molding rubber, we are working with a non-compressible material at extremely high pressures.

In Figure 5 we show a two-plate motor mounting now being used by one of the automobile manufacturers.

"A" shows the original design which required the use of a mold that would have been costly to construct and uneconomical to operate and maintain.

"B" shows the revised design. This retains the basic characteristics of the part while eliminating the feature which complicated the mold design and increased molding costs.

The part, as originally designed, required a mold with a bar at each end of the cavity to locate top and bottom inserts. In addition, loose plugs were required to form the round cavity shown in the rubber section at each end. We could see no need of this complicating feature. It added nothing to the efficiency of the mounting, but did add appreciably to the cost of the mold and the finished part.

In the redesigned part we have removed the rubber section which formed the round cavity, thus eliminating the need of the loose plugs.

The customer recognized the inefficiencies of the original design and revised his prints in line with our suggestions.

The examples we have shown demonstrate how minor design features can appreciably affect the ultimate cost of mechanical rubber goods products. We hope this exposition will convince design engineers that it will be profitable for them to examine their products and eliminate needless features.

Specific Problems in Mold and Product Design

We recognize that many engineers are not conversant with mechanical rubber goods manufacturing techniques and their limitations. To assist those without this knowledge, we have prepared the following questionnaire.

If the engineer will examine his part in the light of these queries, a more economical design may result.

1. Is the design as simple as can be devised?

2. Are dimensional tolerances as liberal as is practical? Note—Mechanical rubber parts cannot be held to tool room tolerances without resorting to very expensive handling.

3. Is the rubber compound specified selected with functional requirements in mind? We recommend the use of the ASTM-SAE Specification — D735-52aT[3] SAE Standard: 10R.[4]

4. Are the metal inserts essential?

5. Is insert design such that inserts can be produced economically?

6. Are insert dimensional tolerances realistic?

7. Would mechanical attachment of the rubber to the insert be sufficient, or is a chemical bond required? Mechanical attachment or inclusion is usually the most economical.

8. Is provision made for locating and holding the inserts in the proper position? Avoid floating inserts.

9. Is part designed so that a two-plate mold can be used? Avoid designs requiring multiple-plate molds and loose parts or mandrels.

10. Can the part be designed so as to make strip molding practical?

11. Can radii at mold parting line be eliminated?

12. Is close trim of part from waste flash essential?

13. Will type of finish allow dry ice or abrasive tumbling? Mold finish is usually retained if dry ice method is used. Tumbling is cheapest method available for complete flash removal.

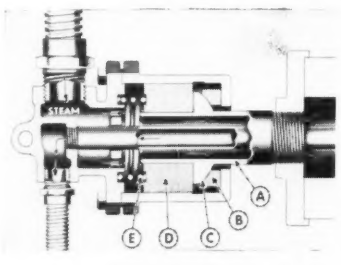
14. Is it essential that all rubber flash be removed from the exposed surface of the inserts? If not essential on all areas, indicate what portion of the flash must be removed and show allowable thickness of flash that can remain.

This list is admittedly incomplete because it is impossible for us to predict all factors which may be involved in the manufacture of a mechanical rubber goods item. Any engineer who wishes help or counsel, when faced with the problem of designing a rubber part, should feel free to call upon a rubber company for assistance. Firestone and others maintain sales engineering departments solely to give this counsel and service. They will, I am sure, welcome all inquiries.

[3] "ASTM Standards on Rubber Products, December, 1952." American Society for Testing Materials, 1916 Race St., Philadelphia, Pa.

[4] "SAE Handbook." Society of Automotive Engineers, 29 W. 39th St., New York, N. Y.

Self-Supporting Rotary Joint



Section of Johnson Type S Joint Showing Construction: (A) Rotating Nipple; (B) Seal Ring; (C) Nipple Collar; (D) Guide; and (E) Spring

THE redesigned Series 2000 Type S self-supporting joint, manufactured by The Johnson Corp., Three Rivers, Mich., for admitting steam or other fluids into rotating rolls, is now on the market. Compared to the original Type S, the new units are reported to be decreased in weight, size, and cost, while having a life expectancy increased by 25%. No lubrication is required for the packless joint, which shifts as the roll shifts and which employs a flexible hose to follow the journal's movement.

In operation, a hemispherical collar on the nipple of the joint rotates against the matching concave surface of a carbon-graphite seal ring, while the bearing surface of the nipple rotates on a carbon-graphite guide; the initial seating pressure within the joint is maintained by means of a spring. The new Series 2000 is available for both through-flow and syphon pipe-type arrangements in a wide variety of threaded nipple sizes for pressures up to 250 psi. and for temperatures up to 450° F.

Development of the Activated Hydroperoxide-Dextrose Formula for Hot Rubber[1]

R. F. McCann,[2] R. W. Laundrie,[2] D. Druesedow,[3] R. S. Reynolds[3]

EARLY in 1951 the government synthetic polymer plants in stand-by status were reactivated to produce synthetic polymer in sufficient quantities to permit the stockpiling of natural rubber. All rubber, natural and synthetic, was in great demand, and the possibility was advanced that more synthetic rubber could be produced by better utilization of equipment then in operation. This could be done by utilizing polymerization formulae that yielded higher polymerization rates. As a result, the Government Laboratories and B. F. Goodrich Chemical Co. investigated new polymerization formulae for standard GR-S polymerized at 117-122° F.

Earlier work had been done in the synthetic rubber program, using ferricyanide-activated, potassium persulfate initiated, (1-2)[4] hot GR-S, but this formula was eliminated because of the inconsistent polymerization rates obtained and the fact that the polymer was stained by the iron compounds retained. In addition, it was felt that some of the cold rubber activator systems (3-7) might be adaptable to hot rubber production, and the standard hydroperoxide-dextrose iron-redox recipe, called the low-sugar recipe, and the peroxamine system were investigated. The peroxamine system offered a suitable fast GR-S-10 type of recipe, but no satisfactory shortstop was found to prevent adequately the conversion rise; so this recipe was abandoned. However, variations of the standard low-sugar cold rubber recipe showed promise, and one of these, the hydroperoxide-dextrose formula developed by the Government Laboratories and further adjusted by Goodrich Chemical, was selected for use.

The system was first suggested by representatives of the Hercules Powder Co. to utilize a potassium persulfate-cumene hydroperoxide catalyst and a low-sugar, ferric sulfate-sodium pyrophosphate activator. The original aim of the program was to develop a formula that would yield a reproducible reaction time of about 10-12 hours to 72 ± 3% conversion with fresh monomers, but the desired cycle was reduced to 8-10 hours when it was found that production plant equipment could handle the reaction in less time. The original pilot-plant polymerizations pertaining to the development of the hydroperoxide-dextrose formula were conducted in bottles and subsequently in five- and 500-gallon reactors at the Government Laboratories. In addition, since a number of the production plants are operated continuously, both the rosin acid soap and fatty acid soap formulae were run in the 12, 20-gallon reactor continuous unit comparing the reaction characteristics of the normal persulfate-catalyzed formulae with the hydroperoxide-dextrose formula. The formula was finally adapted and proved in the plant reactors by Goodrich Chemical at the Institute, W. Va., plant. The development of the hydroperoxide-dextrose formula in the several phases from bottles to 3,750-gallon reactors is presented in this paper.

Bottle Polymerizations

The original polymerization experiments to develop the hydroperoxide-dextrose formula with rosin acid soap were conducted at the Government Laboratories in eight-ounce bottles according to a mixed activated system as suggested by representatives of Hercules Powder. This system utilized a mixed catalyst composed of potassium persulfate and cumene hydroperoxide (CHP) in conjunction with a ferric sulfate-sodium pyrophosphate activator. Results of these first polymerizations are shown in Table 1.

TABLE 1. BOTTLE POLYMERIZATION IN A MIXED ACTIVATED SYSTEM AT 122° F.*

(Butadiene/Styrene, 71.5/28.5; Rosin Soap, 5.0; DDM, 0.90; and Water, 180 Parts)

(Mixed Activator, $K_2S_2O_8$, 0.20-Part, and CHP, 0.056-Part)

Part			Conversion, % (in Hrs.)				
Ferric Sulfate	Sodium Pyrophosphate	Dextrose	3	6	9	12	15
Activator Prepared by Dissolving All Water-Soluble Salts in One Solution							
0.0134	0.1472	None	6	15	27	46	66
0.0134	0.1472	0.10	29	75	—	—	—
0.0134	0.1472	0.50	38	57	81	—	—
0.0134	0.1472	1.0	33	52	52	53	55
0.0134	0.1472	2.0	27	—	32	29	31
Activator Prepared by Dissolving Water-Soluble Salts Separately							
0.0134	0.1472	None	13	26	44	63	—
0.0134	0.1472	0.10	24	66	84	—	—
0.0134	0.1472	0.50	43	66	85	—	—
0.0134	0.1472	1.0	39	62	68	—	—
0.0134	0.1472	2.0	38	44	48	46	—
Activator Prepared by Dissolving All Water-Soluble Salts in One Solution							
None	None	None	10	21	38	55	69
0.0108	0.1187	0.01	12	27	48	71	81
0.0108	0.1187	0.02	13	34	62	80	—
0.0108	0.1187	0.03	14	39	70	84	—
0.0108	0.1187	0.04	17	50	80	—	—
0.0108	0.1187	0.05	20	61	86	—	—
Activator Prepared by Dissolving Water-Soluble Salts Separately							
0.0108	0.1187	None	12	22	39	57	76
0.0108	0.1187	0.01	14	33	58	78	—
0.0108	0.1187	0.02	17	46	75	—	—
0.0108	0.1187	0.03	19	53	78	—	—
0.0108	0.1187	0.04	20	57	82	—	—
0.0108	0.1187	0.05	21	58	83	—	—
Normal Aged Activator Procedure							
None	None	None	12	17	29	47	65
0.0108	0.1187	0.01	13	28	53	73	87
0.0108	0.1187	0.02	12	37	70	86	—
0.0108	0.1187	0.03	18	52	78	—	—
0.0108	0.1187	0.04	21	62	84	—	—
0.0108	0.1187	0.05	21	69	85	—	—

*Purity of butadiene and styrene was about 98 and 99.5%, respectively; for all bottle and pilot-plant charges.

The method of preparing the activator for these runs did not appear to affect the polymerization activity, but it was observed that, as the dextrose charge was increased up to about 0.50-part, the rate of reaction increased. On the basis of these experiments, further development was

[1] This work was performed as a part of the research project sponsored by the Reconstruction Finance Corp., Office of Synthetic Rubber, in connection with the Government Synthetic Rubber Program.

[2] Government laboratories, University of Akron, Akron, O.

[3] B. F. Goodrich Chemical Co., Akron.

[4] Numbers in parentheses refer to Bibliography items at end of this article.

undertaken by a mixed catalyst-dextrose formula. Additional bottle polymerizations were conducted with various oxidants at different dextrose levels.

These data, presented in Table 2, showed that 0.056-part of CHP and 0.10-part of dextrose, as the activating couple, seemed to offer the best advantage with respect to cost and desired rates, compared with the other methods. To determine the optimum hydroperoxide concentration with 0.025- and 0.05-part of dextrose, bottle polymerizations were conducted with the various CHP or PMHP (para-menthane hydroperoxide) concentrations shown in Table 3. Generally, slightly higher conversions resulted with PMHP than with CHP. Based on the data from bottle polymerizations, it appeared that a CHP or PMHP charge of 0.04- to 0.05-part and a dextrose charge of 0.05-part would be required to obtain a 10- to 12-hour reaction time to 72% conversion in batchwise polymerizations.

It was observed at the Goodrich Chemical laboratories that the latex prepared by the hydroperoxide dextrose formula in bottle polymerizations at 122° F. was slightly more viscous than that prepared by the persulfate formula.

TABLE 2. BOTTLE POLYMERIZATIONS WITH VARIOUS CATALYSTS AND DEXTROSE

(Butadiene/Styrene, 71.5/28.5; Rosin Soap, 5.0; DDM, 0.90; and Water, 180 Parts)

Part			Conversion, % (in Hrs.)				
$K_2S_2O_8$	CHP	Dextrose	3	6	9	12	15
		CHP and Dextrose					
None	0.056	None	2	4	8	14	27
None	0.056	0.01	2	4	11	19	35
None	0.056	0.05	3	8	21	58	79
None	0.056	0.10	5	15	52	79	82
		$K_2S_2O_8$ and Dextrose					
0.20	None	None	7	17	34	49	64
0.20	None	0.01	8	18	33	49	65
0.20	None	0.05	8	21	37	54	72
0.20	None	0.10	10	23	42	61	74
0.30	None	0.01	10	23	43	65	79
0.30	None	0.05	10	23	43	65	81
0.30	None	0.10	10	22	42	65	80
0.30	None	0.50	11	23	—	—	—
0.30	None	1.00	11	23	43	70	83
0.30	None	2.00	11	24	45	73	100
0.30	None	None	8	20	35	53	69
		$K_2S_2O_8$, CHP, and Dextrose					
0.20	0.056	0.01	13	24	43	63	71
0.20	0.056	0.05	12	27	51	78	—
0.20	0.056	0.10	9	32	58	77	—

TABLE 3. BOTTLE POLYMERIZATIONS IN A HYDROPEROXIDE-DEXTROSE SYSTEM WITH CUMENE HYDROPEROXIDE AND PARA-MENTHANE HYDROPEROXIDE

(Butadiene/Styrene, 71.5/28.5; Rosin Soap, 5.0; DDM, 0.90; and Water, 180 Parts)

Part		Conversion, %									
		3 Hrs.		6 Hrs.		9 Hrs.		12 Hrs.		15 Hrs.	
CHP or PMHP	Dextrose	CHP	PMHP	CHP	PMHP	CHP	PMHP	CHP	PMHP	CHP	PMHP
0.02	0.025	4	5	18	9	42	29	59	57	61	75
0.04	0.025	4	13	16	28	35	58	62	74	73	84
0.06	0.025	11	—	34	—	60	—	72	—	82	—
0.10	0.025	5	3	16	10	33	21	63	43	83	71
0.15	0.025	7	12	14	34	30	63	66	78	82	84
0.02	0.05	5	13	15	36	43	64	54	76	54	88
0.04	0.05	6	17	18	35	53	70	72	84	73	91
0.06	0.05	6	16	21	46	60	76	81	88	—	93
0.10	0.05	8	13	22	40	67	73	81	83	90	91
0.15	0.05	9	5	27	15	63	39	84	76	94	88

TABLE 4. EFFECT OF THE ADDITION OF AN ELECTROLYTE (TRISODIUM PHOSPHATE*)

Part				Conversion, % (in Hrs.)		
CHP	Dextrose	$K_2S_2O_8$	$TSP{\cdot}12H_2O$	4	8	12
(Butadiene/Styrene, 75/25; Rosin Soap, 4.3; DDM, 0.7; Water, 165 Parts) Bottle Polymerization Data						
None	None	0.3	None	10.0	21.0	36.5
0.05	0.03	None	None	9.5	31.5	60.0
0.05	0.03	None	0.1	12.0	35.5	63.5
0.05	0.03	None	0.2	11.0	29.5	57.0
0.05	0.03	None	0.4	11.0	29.5	57.0
0.05	0.03	None	0.6	13.0	35.5	58.0
3750-Gallon Reactor Data—Butadiene/Styrene, 75/25; Rosin Soap, 4.3; DDM, 0.76; and Water, 165 Parts						
0.05	0.05	None	None	43.0 at 6.0 hrs.—(latex viscous—		
0.07	0.05	None	None	57.9 at 5.8 hrs.—(temp. control lost		
0.07	0.05	None	0.25	80.1 at 13.3 hrs.—(latex fluid—		
0.07	0.05	None	0.25	73.6 at 13.8 hrs.—(temp. control maintained		

Butadiene/Styrene, 75/25; Sodium Fatty Acid Soap, 4.3; DDM, 0.72; Water, 165; $TSP{\cdot}12H_2O$, 0.4-Part

Bottle Laboratory Data

				Conversion, % (in Hrs.)			
				2	4	6	8
0.04	0.04	None	None	10.0	24.5	39.0	53.5
0.04	0.04	None	0.1	12.0	28.0	44.0	60.5
0.04	0.04	None	0.2	10.0	28.0	44.5	61.0
0.04	0.04	None	0.3	11.0	28.0	44.5	60.0
0.04	0.04	None	0.4	10.0	26.0	42.0	57.5
0.04	0.04	None	0.6	10.0	26.0	41.5	57.5

*Temperature of polymerization, 122° F.

TABLE 5. EFFECT OF FERROUS SULFATE ON THE HYDROPEROXIDE-DEXTROSE FORMULA*

(CHP, 0.05-Part)

Part		Conversion, % (in Hrs.)		
Dextrose	$FeSO_4{\cdot}7H_2O$	2	4	6
(Butadiene/Styrene, 75/25; Rosin Soap, 4.3; DDM, 0.7; Water, 165; and $TSP{\cdot}12H_2O$, 0.22 Parts)				
0.03	None	16.5	36.0	55.0
0.03	0.0005	20.0	48.0	70.5
0.03	0.001	21.0	48.0	70.5
0.03	0.002	22.0	48.0	70.5
0.03	0.003	23.0	48.0	66.5
0.03	0.005	23.5	52.5	67.5

Effect of Complexing the Iron in the System with Potassium Cyanide

(Butadiene/Styrene, 71.5/28.5; Rosin Soap, 5.0; DDM, 0.9; and Water, 180 Parts)

Part		Conversion, % (in Hrs.)			
Dextrose	KCN	3	6	8	12
0.05	None	7.8	33.5	66.6	82.9
0.05	0.005	6.7	14.2	20.0	26.6
0.05	0.05	6.5	13.6	20.0	26.7
0.05	0.10	3.4	7.3	15.4	23.6

*Temperature of polymerization, 122° F.

Since potassium persulfate acts in the system not only as a catalyst, but as a viscosity reductant, trisodium phosphate was added to the hydroperoxide-dextrose system, and this yielded a more fluid latex. The effect of the trisodium phosphate, however, was not completely demonstrated until charges were made in the large-scale (3,750-gallon capacity) plant reactors where it was impossible to maintain temperature control without the addition of trisodium phosphate. The results of the experiments with trisodium phosphate additions are shown in Table 4 for both sodium fatty acid and rosin acid soap emulsified systems as well as data for the 3,750-gallon runs at Institute, employing rosin acid soap emulsification. No effect on the reaction rate was observed that could be assigned to the indicated trisodium phosphate charged.

The effect of the addition of small quantities of ferrous sulfate is presented in Table 5 and shows that the added iron increased the reaction rate. To demonstrate that iron is necessary in this polymerization system to maintain high rates of reaction, potassium cyanide was added to the charge to complex any available iron (8). The results of these changes (Table 5) show that when the iron is made unavailable by potassium cyanide, much lower polymerization rates are obtained.

Table 6 presents the data demonstrating the separate effects of hydroperoxide and dextrose on the rate of reaction. From these data it can be seen that the dextrose level is the rate controller where sufficient iron is present as an impurity in the other ingredients used.

TABLE 6. THE EFFECT OF HYDROPEROXIDE AND DEXTROSE IN THE HYDROPEROXIDE-DEXTROSE FORMULA*

Parts			Conversion, % (in Hrs.)			
CHP	Dextrose	$K_2S_2O_8$	2	4	6	8
(Butadiene/Styrene, 75/25; Sodium Fatty Acid Soap, 4.3; Water, 165; and TSP·12H_2O, 0.3 Parts)						
None	None	0.3	6.5	18.5	30.5	42.5
0.03	0.04	None	10.0	28.0	46.0	64.0
0.04	0.04	None	10.0	29.0	45.0	64.0
0.07	0.04	None	10.0	28.0	46.0	63.0
0.05	0.015	None	Nil	9.5	19.5	30.0
0.05	0.03	None	7.0	22.0	37.0	52.5
0.05	0.04	None	10.0	25.0	44.5	64.5

*Temperature of polymerization, 122° F.

TABLE 7. SUMMARIZED POLYMERIZATION AND CHARGE DATA FOR 71.5/28.5 BUTADIENE/STYRENE COPOLYMERS PREPARED IN FIVE-GALLON REACTORS AT 122° F. BY MIXED ACTIVATOR FORMULATIONS

Run No.	Part						Reaction Time Hr.	Time to 72% Conv. Hr.*	Final Conv. %	Mooney Viscosity of Polymer ML-4
	$K_2S_2O_8$	CHP	Ferric Sulfate	$Na_4P_2O_7$	Dextrose	DDM				
	(5.0 Parts of Disproportionated Rosin Soap Emulsifier)									
1	0.30	——	——	——	——	0.50	13.6	14.0	70.8	93
11	0.30	——	——	——	——	0.80	11.8	12.3	68.8	73
23	0.30	——	——	——	——	0.90	14.8	14.3	76.6	54
42	0.23	——	——	——	——	0.90	15.0	14.9	72.2	45
43	0.23	——	——	——	——	0.90	15.5	15.3	72.6	49
2	0.20	0.056	——	——	——	0.50	12.6	12.8	70.8	94
3	0.20	0.056	——	——	0.01	0.50	12.2	11.5	75.3	92
4	0.20	0.056	——	——	0.05	0.75	10.5	9.8	78.3	75
5	0.20	0.056	0.01	——	——	0.75	13.5	13.8	69.6	75
7	0.20	0.056	0.0108	0.1187	0.03	0.75	10.3	10.3	72.0	61
8	0.30	——	0.0108	0.1187	0.03	0.75	7.0	7.1	71.2	61
14	——	0.056	0.0108	0.1187	——	0.90	24.0	25.0	71.2	54
15	——	0.10	0.0108	0.1187	——	0.90	16.9	17.2	71.4	60
18	0.30	——	0.0108	0.1187	——	0.90	14.3	14.3	72.0	51
12	0.30	——	——	——	0.05	0.80	12.0	13.0	69.8	54
13	0.30	——	——	——	0.05	0.80	11.8	11.0	75.0	54
			$FeSO_4$ $7H_2O$	$K_4P_2O_7$						
19	0.30	——	0.01	0.014	——	0.90	14.0	14.0	72.0	43
20	0.30	——	0.02	0.028	——	0.90	13.8	14.5	69.0	46
21	——	0.056	0.01	0.014	——	0.90	29.0	30.0	70.8	43
22	——	0.056	0.02	0.028	——	0.90	24.0	24.0	72.0	46
24	——	0.10	0.01	0.014	——	0.90	22.0	22.5	71.2	55
25	——	0.10	0.02	0.028	——	0.90	23.0	26.0	66.4	38
26	——	0.15	0.01	0.014	——	0.90	17.0	16.9	72.4	54
27	——	0.15	0.02	0.028	——	0.90	19.0	19.8	71.0	52
29	——	0.056	——	——	——	0.90	27.0	28.0	70.0	50
30	——	0.10	——	——	——	0.90	20.3	20.5	71.0	57

*Determined by extrapolation or interpolation.

TABLE 8. SUMMARIZED POLYMERIZATION DATA FOR 71.5/28.5 BUTADIENE/STYRENE COPOLYMERS PREPARED IN FIVE-GALLON REACTORS AT 122° F. BY THE HYDROPEROXIDE-DEXTROSE FORMULA

Run No.	Part			Reaction Time Hr.	Time to 72% Conv. Hr.*	Final Conv. %	Mooney Viscosity of Polymer ML-4
	PMHP	Dextrose	DDM				
	(4.3 Parts of Disproportionated Rosin Soap Emulsifier)						
46	0.025	0.025	0.85	8.5	8.0	72.8	68
47	0.025	0.025	0.85	8.5	8.4	72.2	53
31	0.05	0.025	0.80	9.5	9.0	74.8	58
32	0.05	0.025	0.90	8.3	8.6	69.4	45
44	0.05	0.025	0.85	8.3	9.0	70.2	55
45	0.05	0.025	0.85	11.6	10.9	74.8	60
33	0.05	0.02	0.85	10.9	10.8	72.4	57
34	0.05	0.01	0.85	13.0	13.4	69.8	56
	CHP						
28	0.056	0.025	0.90	8.7	8.1	73.4	59
	(4.3 Parts of Sodium Fatty Acid Soap Emulsifier)						
	Part PMHP						
37	0.025	0.025	0.60	8.0	7.8	74.2	52
38	0.03	0.025	0.60	10.6	10.3	72.8	30
39	0.04	0.025	0.60	11.5	11.4	72.6	59
35	0.05	0.025	0.50	10.3	11.1	68.2	68
36	0.05	0.025	0.50	10.8	10.5	72.4	74
	CHP						
40	0.025	0.05	0.60	7.5	7.4	73.2	55
41	0.025	0.025	0.60	8.8	9.0	70.0	53
	$K_2S_2O_8$						
48	0.23	—	0.60	10.8	11.0	71.2	39
49	0.23	—	0.60	10.8	11.0	71.2	33

*Determined by extrapolation or interpolation.

Five-Gallon Reactor Polymerizations

Results of polymerizations in five-gallon reactors with the same type of mixed activator formulations, as used in the bottle work, are shown in Table 7, and those with the simplified hydroperoxide-dextrose couple are shown in Table 8. The data confirm the previous results:

From this pilot-plant work, the following observations were made:

(a) Only a slight improvement in the rate of reaction over that normally obtained with potassium persulfate alone was achieved with a mixed catalyst of potassium persulfate and cumene hydroperoxide (Run Nos. 1, 2, 11, 18, 23, 42, and 43).

(b) Reaction rates with potassium persulfate or CHP as catalysts in conjunction with activators consisting of ferrous sulfate and potassium pyrophosphate were low and non-reproducible (Run Nos. 19, 20, 21, 22, 24, 25, 26, and 27).

(c) Equivalent and higher rates of reaction were achieved when CHP or PMHP was used with dextrose (Run Nos. 28, 31, 32, 33, 34, 44, 45, 46, and 47).

(d) The improvement in reaction rates occasioned by the addition of similar small amounts of dextrose was greater in the rosin soap than in the fatty acid soap system. The time to reach 72% conversion of the control was about 15 hours with the rosin acid soap (Run Nos. 42 and 43) and 11 hours with the fatty acid soap (Run Nos. 48 and 49). The runs employing rosin soap were 28, 31, 32, 33, 34, 44, 45, and 46; while those utilizing fatty acid soap were 35, 36, 37, 38, 39, 40 and 41.

TABLE 9. SUMMARIZED CHARGE AND POLYMERIZATION DATA FOR 71.5/28.5 BUTADIENE/STYRENE COPOLYMERS PREPARED IN 500-GALLON REACTORS AT 122° F. BY A HYDROPEROXIDE-DEXTROSE FORMULA

Run No.	Part		Reaction Time Hr.	Time to 72% Conv. Hr.*	Final Conv. %	Visc. ML-4
	Dextrose	DDM				
	(4.3 Parts of Disproportionated Rosin Soap Emulsifier)					
	PMHP (0.05-Part)—Dextrose					
1	0.025	0.90	9.1	9.2	71.7	44
2	0.025	0.80	10.0	10.5	69.3	49
3	0.025	0.75	8.5	8.6	71.2	59
4	0.025	0.70	10.8	10.5	73.4	61
5	0.025	0.72	11.0	10.8	72.8	63
6	0.025	0.78	13.0	13.4	70.4	58
7	0.035	0.78	6.5	6.5	72.0	49
	(4.3 Parts of Sodium Fatty Acid Soap)					
	CHP (0.05-Part)-Dextrose					
8	0.025	0.55	8.7	8.8	71.0	37
9	0.03	0.45	8.0	8.1	71.7	50
10	0.03	0.45	7.5	7.6	70.7	68
11	0.03	0.50	10.8	10.2	73.6	56
12	0.03	0.51	13.5	12.7	74.2	53
13	0.04	0.50	8.0	8.1	71.4	57
14	0.04	0.535	12.0	12.2	71.4	50
15	0.03	0.535	9.5	9.4	72.7	47

*Determined by interpolation or extrapolation.

500-Gallon Reactor Polymerizations

Results of larger-scale polymerizations in 500-gallon reactors, presented in Table 9, generally indicated the same high rates of reaction as those obtained in bottles and five-gallon reactors at similar hydroperoxide and dextrose levels. Reaction times to 72% conversion, ranging from 6.5 to 10.8 hours, were obtained by a PMHP-dextrose formula with sodium rosin acid soap emulsification. When sodium fatty acid soap was used as the emulsifier and CHP-dextrose as the activator ingredients, reaction times to 72% conversion of from 7.6 to 12.7 hours were realized.

Twelve 20-Gallon Reactor Continuous Polymerizations

I. Rosin Acid Soap Emulsification

Continuous runs (9-10) were conducted in the 12-in-series 20-gallon reactor unit at the Government Laboratories. Initially, a standard GR-S-10 run was made, at 117° with 0.30-part of potassium persulfate, to serve as a control. A displacement time of 21 hours was required to attain $72 \pm 3\%$ conversion, but when 0.075-part of CHP and 0.065-part of dextrose were substituted for the persulfate, a displacement time of 12 hours yielded latex of $72 \pm 3\%$ conversion. This reduction in overall displacement time by the continuous process is even more pronounced than by the batchwise process and is of considerable interest in the production of synthetic copolymer since many of the units have been converted to continuous operation.

II. Fatty Acid Soap Emulsification

A run (11) with fatty acid soap as the emulsifier was conducted at 117° F. utilizing three hydroperoxides, CHP, DIBP (diisopropylbenzene monohydroperoxide), and PMHP at the dextrose level required to maintain a conversion of $72 \pm 3\%$ while operating with a displacement time of 12 hours. Hydroperoxide-dextrose combinations of CHP 0.05-dextrose, 0.16; DIBP, 0.03-dextrose, 0.03; and PMHP, 0.05-dextrose, 0.16-part resulted in conversions of $72 \pm 3\%$. Of special interest is the low level of DIBP and dextrose required to achieve the desired conversion range; while PMHP and CHP were interchangeable. Standard GR-S prepared with persulfate in the continuous unit required a displacement time of 15 hours to obtain $72 \pm 3\%$ conversion. Displacement times of less than 12 hours would have been investigated, except that production plants with present equipment are not able to maintain temperature control with higher polymerization rates.

Pilot-Plant Polymer Evaluation

TABLE 10. PHYSICAL PROPERTIES OF HYDROPEROXIDE-DEXTROSE POLYMERS

Compounding Recipes

	I	II
Polymer	100	100
EPC black	40	40
Zinc oxide	5	5
Sulfur	2	2
Benzothiazyl disulfide	3	1.75
Stearic acid	1.5	—

Compounding Recipe	Min. Cured at 292° F.	XP-222 L1-L3 PMHP-Dextrose I	Production GR-S-10 I	XP-223 L1-L3 CHP-Dextrose II	Production GR-S II
300% Modulus, psi.	25	450	550	540	480
	50	900	1130	990	1140
	100	1250	1510	1360	1690
Tensile strength, psi.	50	2960	3280	3120	2790
Elongation, (% at break)	50	620	590	610	540

Stress-strain data for the hydroperoxide-dextrose copolymers and control GR-S and GR-S-10 production copolymers, presented in Table 10, generally indicate comparable properties for the experimental and the control polymers. There appears to be no deterioration in any of the physical properties that can be attributed to the increased reaction rate obtained with the hydroperoxide-dextrose formula.

Production-Plant Polymerizations

The first production-plant polymerizations based on the hydroperoxide-dextrose formula were made at the Institute, GR-S copolymer plant operated by Goodrich Chemical for RFC. To date, three experimental runs (Table 11) have been successfully completed, and plant data on these show that the polymerization capacity can be increased approximately 18 to 31% by the use of the hydroperoxide-dextrose formulae; however, it was necessary to add 0.25- to 0.30-part of trisodium phosphate to the formula as a viscosity reductant to maintain a fluid latex and permit control of polymerization temperature in the large reactors. The polymer prepared by this formula is equal or superior to persulfate polymer as measured by physical test data (Table 12).

TABLE 11. PRODUCTION-PLANT DATA—HYDROPEROXIDE-DEXTROSE RECIPE

Ingredients	Parts GR-S X-655	GR-S X-671	GR-S X-694
Butadiene	74.8	74.5	71
Styrene	25.2	25.5	29
Sodium rosin acid soap	4.3	—	—
Fatty acid soap	—	4.3	4.3
Trisodium phosphate	0.25	0.3	0.3
DDM	0.76	0.47	0.476
Sodium hydroxide	*	*	*
Cumene hydroperoxide	0.05	0.05	0.05
Dextrose	0.05	0.04	0.04
Water	165	165	165
Good-rite 3955	0.10	0.10	0.10
Stalite	—	—	1.25%
PBNA	1.25%	1.25%	—

	GR-S X-655	GR-S-10 Control	GR-S X-671	X-630 Control	GR-S X-694	GR-S-1000 Control
Reaction time to 72% conv., hr.	11.7	17	11.2	15.2	13.3	16.2
Butadiene blend purity—%	93	—	94	94	93	92
Styrene blend purity—%	95	—	95	95	95	93.5
Raw Mooney viscosity, ML-4	51	53	49	49	46	50
Compound Mooney viscosity, ML-4	51	56	57	56	50	56
Volatile matter—%	0.08	0.24	0.13	0.26	0.195	0.155
Ash—%	1.03	1.24	1.02	1.26	1.12	1.23
Rosin acid—%	4.62	4.90	—	—	—	—
Soap—%	0.10	0.11	—	—	—	—
Fatty acid—%	—	—	4.90	5.26	5.34	5.08
Soap—%	—	—	0.25	0.18	0.15	0.11
Bound styrene—%	20.8	19.8	19.3	19.5	22.8	23.1
Stabilizer—%	1.20	1.28	1.24	1.18	1.31	1.27

*Amount of NaOH required to impart the desired pH to the soap solution.

TABLE 12. PHYSICAL DATA FOR PLANT PRODUCED POLYMER—HYDROPEROXIDE-DEXTROSE RECIPE

	X-655	GR-S-10	X-671	X-630	X-694	GR-S 1000
Tensile strength, (psi.)						
50 min.	3080	2740	3100	2990	3010	3050
Elongation, %, 50 min.	670	610	590	595	620	620
300% Modulus, (psi.)						
25 min.	370	400	500	480	450	520
50 min.	900	870	1045	1075	940	930
100 min.	1300	1200	1510	1600	1390	1390

GR-S X-655, the first hydroperoxide-dextrose formula to be polymerized in production-plant equipment, was a 20% bound styrene copolymer prepared at 122° F. with rosin acid soap (Table 11). Approximately 275,000 pounds of X-655 were made at a rate 31% higher than its non-activated counterpart GR-S-10. The stress-strain properties (Table 12) indicate improved elongation and tensile with similar modulus values for the activated polymer compared to the GR-S-10 control.

(*Continued on page 214*)

When Customers' Products Are Made to Specifications, Prompt Shipment on Definite Dates Is Generally among the Demands

Frank Krumneaux[1]

Fig. 1. Operator Consulting Sched-U-Graph Board at Sponge Rubber Products to Determine Status of Customer's Order

PART of the problem of producing to customer specifications is at the end of the production line and after final inspection—shipping according to schedule. Promptness in shipping is even more important when the product is part of an engineered assembly such as an automobile.

Assembly lines, of course, will function smoothly only when all required parts arrive in steady flow and on time. Similarly, production lines operate smoothly only when all information relative to progress is received on time.

Sponge Rubber Products Co. manufactures, among other items, several molded rubber products for use in automobile—parts which must be produced according to strict specifications and, above all, must reach our customers on schedule. We accomplish this aim through efficient control of production—a system devised to meet our particular needs, which gives us immediate knowledge of impending or actual delays in schedule.

There was a time when production control was the last consideration in Sponge Rubber Products Co.—that was back in 1923 when the enterprise was started as a spare-time venture by four young men. At that time, with only a good idea for conducting and building a business and scarcely any capital, the infant company's biggest problem was to find buyers for the production of its plant. Its product was a single item—a sponge rubber ball in one size only. But these men had set out to prove that if they made a good product efficiently, they could sell it.

In that basic and sound business philosophy all subsequent advancement of the company has been founded. It was only a year later that the four young men who had been their own production crew, sales staff, and accounting department, began to employ additional help. By 1926 it was necessary to purchase another plant. Sponge rubber was a comparatively new process at the time, and as new uses were discovered the company's line expanded. More plant space was acquired in 1930 and was expanded after World War II.

Constantly behind this growth was that sound philosophy—make a good product efficiently. It has been the basis upon which every change, every new development, every expansion move has been undertaken—"produce efficiently."

Is there a new fabrication procedure? It is tested in the laboratory to determine its efficiency before adopting it. Is there a new accounting principle or method? We try it first to determine its efficiency before we put it into general practice.

Nothing is left to mere judgment at Sponge Rubber Products. If an idea or a method or a machine seems to have merit, we make certain our appraisal of it is correct before we make it part of our company or its activities.

It was on this basis that we installed our initial set of Remington Rand Sched-U-Graph boards when we de-

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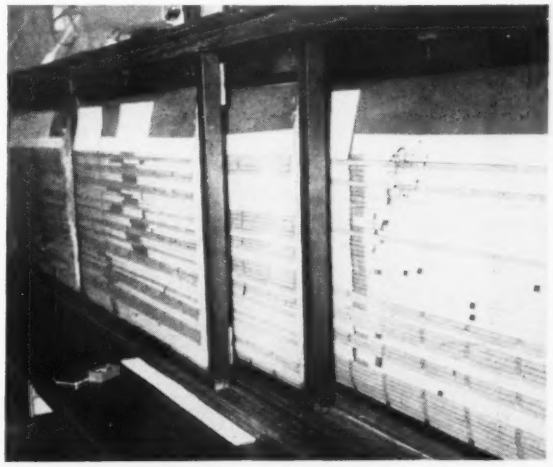

Fig. 2. Sched-U-Graph Boards Mounted in Stacks of Three and Fitted in Grooves to Permit Easy Access

vised our present production control system. A single board, set up temporarily in the production control office, quickly demonstrated the efficiency with which the system could operate to keep us informed of the progress of every order.

The system itself is unusually simple. Only two forms are required—the order card and the scheduling form. When an order is received from sales, it is routed through production control where the order card is made up to show the customer's name, the quantity ordered, the part number and description, job number, and customer's order number. The routing for shipment also is entered on the order card.

The order is routed through to the mill room for the cutting of raw stock, goes to the press room for molding, then to the processing departments for trimming and cleaning and final assembly—thence to inspection and shipping. Through all these processes the production control is informed of progress so that a Graph-A-Matic signal can be set on the Sched-U-Graph board to show the status of the order.

It requires only a glance at the Sched-U-Graph boards to determine immediately if any order is unduly delayed in process. When such a condition prevails, a red signal is inserted in the visible portion of the Sched-U-Graph pocket, and an expediter immediately is despatched to the source of delay. (See Figure 1.)

Information from the shipping department keeps production control informed of promptness with which the order is being shipped to the customer. For example, if a customer specifies shipment of certain percentages of the entire order on certain dates, the scheduling form in the Sched-U-Graph board carries that information. By way of illustration, if a customer orders 20,000 parts, half of them to be shipped in the week of September 4 to 8 and the remainder two weeks later, the progress of the Graph-A-Matic signal along the scheduling form shows how well the schedule is being followed.

A black signal, placed in the visible portion of the pocket, shows that the final portion of the order is nearly ready for shipment, thus preventing overshipment. A striped signal indicates whether or not there is an inventory of a particular part on hand.

Sched-U-Graph gives us a pliable and efficient control over every phase of production operations. An added touch of efficiency has been acquired through the method by which the boards were installed. We are using, in all, 21 Sched-U-Graph boards for production control alone. These have been mounted in stacks of three on two sides of the room, fitted into grooves so that the boards may be moved from side to side. Thus, one operator can make entries on as many as four of the boards from one position.

Sched-U-Graph, as used in production control, is as much a part of the actual production at Sponge Rubber Products as the molds themselves. The system contributes a large share to the efficiency of our production methods—an efficiency which has been the primary goal of the company since it first began to manufacture toy balls for children over a quarter of a century ago.

Hydroperoxide-Dextrose

(Continued from page 212)

Following the X-655 plant run, X-671 was made in a plant run employing fatty acid soap as the emulsifier. This recipe gave a 26% increase in polymerization capacity compared to the control, X-630. Based on physical data, X-671 showed properties similar to those of the X-630 control.

The third polymer authorized for plant trial of the activated recipe was a 23.5% bound styrene polymer using fatty acid emulsifier. This polymer (X-694) gave an increase in polymerization capacity of 18% compared to the control GR-S 1000. The physical test data revealed that the polymer is equivalent to the control (Table 12).

Summary and Conclusions

The combined efforts of the Government Laboratories, operated by the University of Akron, The B. F. Goodrich Chemical Co., Akron Experimental Plant, and B. F. Goodrich Chemical Co. operated GR-S plant at Institute, W. Va., have resulted in the development and successful adaptation of a hydroperoxide-dextrose formula for polymerization at 122° F. which increases the polymerization capacity of a standard GR-S plant by approximately 18 to 31%, or more. The polymer produced by this formula has been shown to be equal to or better than that produced by the conventional persulfate-catalyzed formula.

Reaction times to 72% conversion of eight to 10 hours were obtained in the pilot plant with this recipe as compared to 11-14 hours normally required for GR-S (sodium fatty acid soap emulsifier) and 15 to 19 hours for the GR-S-10 (sodium rosin acid soap emulsifier) system. In a 12-step 20-gallon reactor continuous unit it was possible to maintain a 12-hour displacement time with hydroperoxide-dextrose activation and rosin acid soap emulsification, while a similar run employing potassium persulfate as the catalyst required 21 hours to attain 72% conversion. With fatty acid soap emulsification and hydroperoxide-dextrose activation a displacement time of 12 hours yielded polymer of $72 \pm 3\%$ conversion employing CHP, DIBP, and PMHP. It was possible to operate at lower hydroperoxide and dextrose levels when DIBP was used as the oxidizing agent. Standard GR-S prepared with persulfate required a displacement time of 15 hours to attain a conversion of $72 \pm 3\%$.

Physical tests conducted on the hydroperoxide-dextrose polymers prepared in the pilot and production plants indicated that they are equivalent to the standard 122° F. GR-S and GR-S-10 production polymers.

Thus, the hydroperoxide-dextrose system offers a means of decreasing the reaction time for GR-S polymerization at 122° F. to the desired level of 10 to 12 hours without sacrificing polymer qualities. In addition, the recipe is simple and readily reproducible; no activator preparation is required, and the rate of reaction can be readily controlled by varying the dextrose level, thereby making the process easily adaptable to production plant operations.

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Editorials

IRW Survey Shows Majority Believes Future Basic Synthetic Rubber Research Should Be Done by Industry

OUR recent survey of a selected group of research directors, research workers, and others on the "who and where" of future basic research on synthetic rubber reveals that two-thirds of the respondents lack confidence in the government research program of the past and believe that private industry may be depended upon to carry on a sufficient volume of fundamental research, if and when the synthetic rubber plants are sold to private industry. Extracts from six of the replies have appeared on this page August through October, and three more are presented this month.

About half of the replies received came from those employed by large companies, not quite half from those employed by small companies, and the remainder from persons not employed by private industry.

The one-third of the replies expressing interest in some sort of cooperative effort in basic research on synthetic rubber, as distinct from depending on the work of individual companies, was from those employed by small companies or not employed in private industry. This group favored the establishment of a research institute supported voluntarily by all interested companies in the industry in proportion to the amount of rubber each consumed and in which all such companies could have a voice in the program.

In spite of the confidence expressed by the majority of the respondents in private industry's ability adequately to provide the necessary basic knowledge for future applied research, it might be that very thorough consideration should be given to the minority opinion, since really fundamental research work may involve projects requiring 10 to 20 years for completion. Such projects do not readily lend themselves to becoming part of the research program of private corporations, however large, and a really long-term program of basic research on synthetic rubbers and other elastomers in this country is very much needed at the present time.

Further extracts from replies received to our query on how to provide for future basic research on synthetic rubber follow:

Reply Number 7 from the research director of a large rubber company states:

"My definition of fundamental research is—original exploration for the advancement of scientific knowledge in fields of present or potential interest, without regard to specific commercial objectives.

"In my opinion enough fundamental research will be carried out by private industry to insure continuing development and applied research adequately to keep pace with the demands of the expanding synthetic rubber industry."

Reply Number 8 from a research worker for one of the large rubber companies is in a similar vein:

"It is my feeling that basic research on synthetic rubber (which aims to increase our understanding of phenomena as distinguished from applied research which seeks to do a specific job) will be carried out vigorously by private industry when the government withdraws its present support. Undirected investigation, which has often meant rather aimless boondoggling in the government rubber program, will not be continued by industry. However, basic research is a most efficient producer of new knowledge, and so while the total expenditure for basic work by industry may be less, I would not be surprised if the results were greater. On the other hand, if a governmental or semi-governmental program were continued even on a reduced scale, the efforts of industry along these lines would be smaller because management would feel that such competition made these efforts less valuable."

Reply Number 9 from another research worker for a large company also favors research by private industry.

"I do not think that a government program of fundamental research as in the past will be adequate for the future. The industry needs fundamental research on natural rubber as well as on many other types of elastomers not included in the government program. The only logical basis for permanently sponsored rubber research by the government lies in the historical connection with the output of the government-owned plants. . . . One may argue that if research is really fundamental, it doesn't matter what particular elastomers are studied as the principles will apply to all. But with the present limited state of our knowledge, this is a booby trap. There is considerable advantage in working with all of the systems in which there is particular interest. . . .

"I think it would be preferable for the rubber industry to examine the research projects sponsored by the government and for the individual companies to select projects to which they would like to contribute support so that interim government support would not be necessary.

"This would be an evolutionary step toward including advanced training on elastomers in our university system in a broad way. This, in turn, would insure that the rubber industry will receive a pertinent share of the basic knowledge which flows from the universities, integrated with the contributions from all of their fields of interest. To my mind, this is a sounder basis for fundamental research than the establishment of an institute for rubber research alone. . . ."

R. G. Seaman

DEPARTMENT OF

PLASTICS TECHNOLOGY

Vacuum Forming of Thermoplastic Sheets

Sanford S. Zimmerman[1]

THE vacuum forming process provides a simple, rapid cycle method of forming thermoplastic sheets by means of heat and a combination of vacuum and atmospheric pressure. In essence, the process consists of clamping the plastic sheet in a frame, applying heat to soften the sheet, and then drawing the sheet over or into a mold by means of vacuum and atmospheric pressure. When sufficiently cool, the formed sheet is removed from the mold.

Material Considerations

Vacuum forming is applicable to all types of thermoplastic (heat-softening) sheets, including vinyl (both rigid and flexible), styrene (both oriented sheet and copolymers), polyethylene, cellulose acetate, cellulose acetate butyrate, acrylic, ethyl cellulose, and others.

[1] General manager, Vacuum Forming Corp., Port Washington, N. Y.

The major material factor affecting the process is the degree of orientation of the sheet. Oriented materials exhibit a greater tendency to shrink over the mold and eliminate webbing (the folding under of excess material on a form because of excessive stretching of the sheet prior to forming). Most thermoplastic sheets show some degree of orientation; the best are oriented styrene and acrylic sheets. Calendered rigid vinyl sheet also shows a high degree of orientation in the direction of sheet flow through the calender. Unoriented materials can also be used in the process and have application where flexibility of the material in the formed state is required.

Sheet thickness is not an important factor in the process, except as it affects the forming cycle. The same applies to the chemical nature of the sheet material. The other properties to be considered when selecting a material for a specific vacuum forming application include rigidity, impact strength, toxicity, clarity, surface finish,

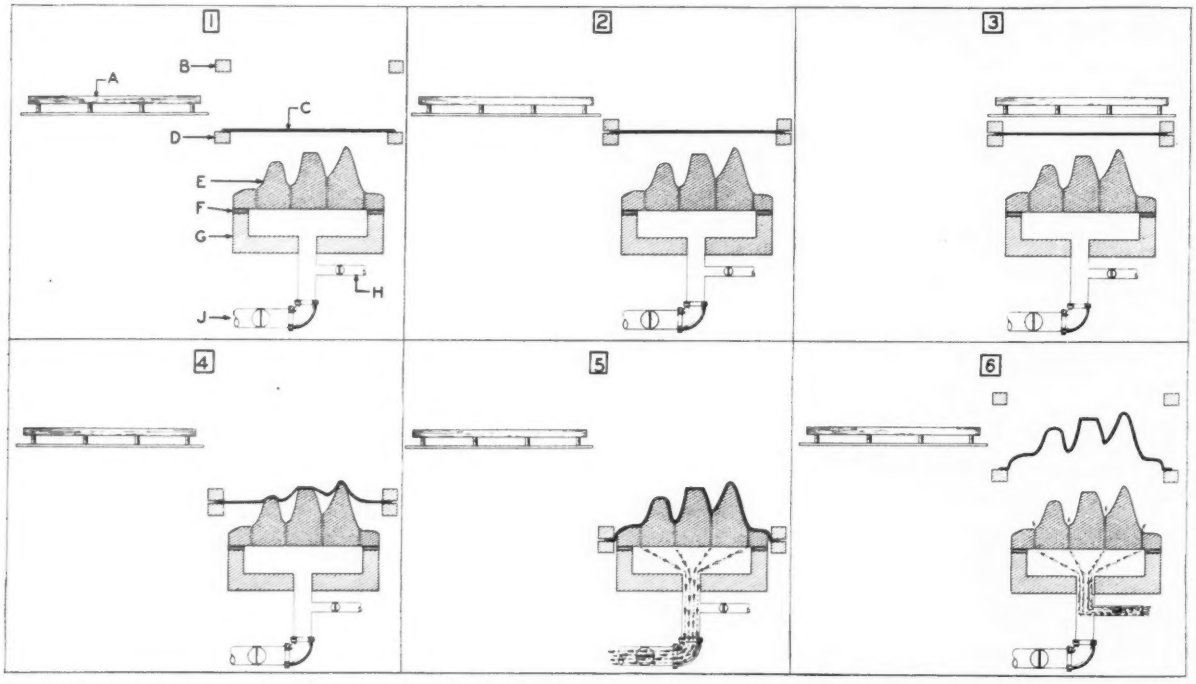

Fig. 1. Schematic Drawing of Operations in the Vacuum Forming Process: *A*, Heater; *B*, Upper Mold Frame; *C*, Plastic Sheet; *D*, Lower Mold Frame; *E*, Male Mold with Vacuum Holes; *F*, Mold Gasket; *G*, Vacuum Box; *H*, Pressure Inlet; and *J*, Vacuum Inlet

color retention, moisture vapor transmission, and ultimate formability of the sheet.

Parts to be made by vacuum forming must be of relatively uniform cross-section throughout since built-up sections cannot be obtained. The other design factors are essentially the same as those encountered with other plastic molding and forming methods to insure release of the part from the mold or form and include the elimination of undercuts and the provision of draft and suitable radii on corners.

Vacuum Forming Process

A schematic representation of the vacuum forming process for plastic sheets is shown in Figure 1 in six steps. Step 1 shows the sheet loaded into the mold frame. The sheet is clamped into the mold frame (Step 2), and a high wattage resistance heater assembly is brought over the sheet (Step 3). The heater is maintained at a temperature in the range from 700-1,100° F. and at a height approximately two inches above the sheet. Both heater height and temperature will depend, to some extent, on the nature and thickness of the plastic sheet.

The heater is held over the sheet until the plastic has reached its forming temperature (approximately 200° F., depending on the type of plastic). When the forming temperature has been attained, the sheet is drawn down over the mold (in the case of the male mold illustrated) and stretched while the heater assembly is drawn back (Step 4). When the sheet has covered the entire mold, the mold assembly is opened to the vacuum system (Step 5). Atmospheric pressure forces the sheet against the mold surfaces as the air under the sheet is drawn out. At full vacuum the pressure employed for forming the sheet would be about 15 psi.

The mold surface conducts heat away from the sheet, setting it into the formed shape. In production runs, the use of water or other media to cool the mold is recommended for faster heat transfer and shorter cycles. When the sheet has cooled, it is ejected from the mold (Step 6) by a combination of raising the frame and introducing air up through the mold's vacuum holes.

Vacuum Forming Equipment

The equipment required for vacuum forming is relatively inexpensive and does not require the application of high pressures. The essential components include a means of holding the sheet over the mold; a heater to soften the sheet; a means of raising and lowering the clamped sheet; a vacuum system; and an air compressor system to aid ejection of the formed part. In production, these components are combined into a machine which is equipped with suitable control mechanisms.

The Vacuum Forming Corp. machine Model No. 50-20 (see Figure 2) features automatic cycle operation; suitability for use with either male or female molds; and a platen adjustable to tilt to permit differential heating of the sheet. This machine has a 60- by 30-inch platen and can accommodate sheets up to 52 by 24 inches in size. The resistance-type heating assembly, which measures 52 by 28 inches in size, is made up of Chromalox strip heaters and requires 30 kilowatts of current. The heater can provide temperatures up to 1,150° F. and is adjustable in height up to 36 inches above the table by means of a worm and pinion gear.

Once the sheet has been loaded into the mold frame, a push-button is pressed to start the machine's automatic cycle. When the cycle has been completed, the operator removes the formed sheet. The machine can also be operated manually when a job is being set up. A combination of pneumatic and hydraulic means is used to close and open the mold frame clamp which holds the sheet. The control system includes a microswitch assembly, pyrometer, vacuum gage, and solenoid valves wired integrally with four delay timers (to regulate the durations of the overall cycle, clamp, heater, and vacuum).

Pump and compressor requirements will depend on the number of machines and the type of installation. The mold clamp frame assembly is adjustable to handle any mold size up to 52 by 24 inches.

Mold Considerations

Either male or female molds can be employed in the vacuum forming process (see Figure 3). Male molds permit the forming of deep parts, even with relatively thin sheets, since the stretching of the sheet over the mold prior to applying the vacuum gives better distribution of sheet thickness throughout the part. With female molds the sheet is held over the mold cavity, and the vacuum system applied instantaneously. This action gives impact stretching of the sheet and does not permit the plastic to maintain relatively uniform wall thickness. On the other hand, female molds give better reproduction of embossing or other fine detail in the formed parts. Male molds, however, do permit the use of a certain amount of embossing, lettering, bas-relief, and other detail.

In view of the relatively low pressure involved in the process, the molds can be made of plaster, wood, plastics, glass, sprayed metal, cast aluminum, and machined steel. The slow cooling of poorly conductive materials, such as plaster, wood, etc., requires that molds made of these materials be cooled by cold-air blast or similar means when rapid cycles are desired. Metal molds can be cored for cooling by means of circulating water or other media.

In working up a mold for a part to be vacuum formed, the use of plaster or wood is recommended for the initial mold. Such molds can be modified or changed quite readily as design changes are made, without the need of scrapping the mold with each little modification. This temporary mold can be translated into a permament mold for production.

The length of the run is the prime factor in determining the type of mold material to be used. Wood or plaster molds are recommended for short runs (below 1,000 pieces); while metal molds are recommended for longer runs.

Fine holes must be put through the mold to allow for drawing the vacuum under the sheet, and to permit the application of air pressure to eject the formed sheet. With plaster molds, wires can be inserted into the material as it is being formed. When the plaster has set, the wires are removed, leaving the required holes in the mold. With molds made of other materials, the holes are drilled. These holes should be as small as possible; diameters should be $\frac{1}{32}$-inch or less.

Other Operations

The complete vacuum forming process also includes the decoration of the plastic sheets, where required, and the cutting out and possible further machining of the formed part.

Preprinting

Although the formed sheets can be decorated by conventional methods, substantial savings can be effected by the use of preprinted plastic sheets to eliminate post-forming decorating operations. This preprinting can be

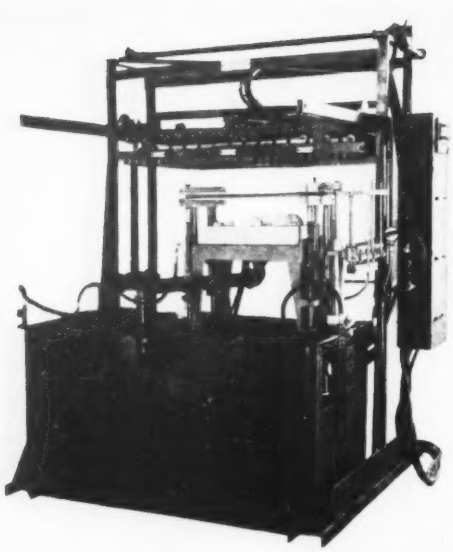

Fig. 2. Model No. 50-20 Vacuum Forming Machine Set up with Male Molds

done by lithography, silk screening, or rotogravure. The procedure most widely used at the present time is to print the sheet in distortion, and the design comes into true perspective when the sheet has been formed. The printing inks used will depend on the nature of the plastic sheet, since no ink is available at present that will print satisfactorily on different plastics.

In setting up the preprinting operation, a number of formed uncolored sheets are first decorated with ink or other suitable colors. These decorated sheets are then put back into the mold clamp frame of the forming machine and reheated. The heater should be maintained at a temperature of about 400° F. and at a height of 6-8 inches above the highest projection of the formed sheet.

By a trial-and-error method the heating time is varied until the formed sheets go back into the original flat condition. This heating time will depend on the plastic memory of the material. Rigid vinyls have given the best results to date in such preprinting set-ups. When a flat, wrinkle-free sheet has been obtained, it is used to make the silk screening or lithograph plates.

It is recommended that the first group of sheets in a run be silk screened to make certain that the registration is correct. If the registration is satisfactory and high production rates are desired, lithographic plates can be made from the silk-screen plates.

Die Cutting

After forming, the sheets are fed to a cutting machine where the formed parts are die cut to the required outline.

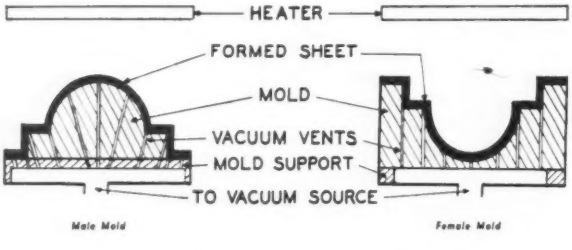

Fig. 3. Drawing of Male and Female Molds

The cutting is done by steel-rule dies in a clicker, dinker, high die, or punch press. On relatively flat pieces up to about three inches in formed height, clicker machines give satisfactory results. A high die press or punch press should be used for deep drawn parts more than three inchs high.

Comparison with Other Processes

Other processes which can be considered along with vacuum forming to manufacture formed products include molding and conventional sheet fabrication. Standard plastic molding methods, such as injection and compression molding, involve high pressures; use molds and equipment whose costs run into many thousands of dollars; and produce items having a relatively high unit cost when compared to vacuum formed parts. In addition, it is almost impossible to injection mold parts having wall sections less than 0.030-0.035-inch thick.

Fig. 4. Typical Vacuum Formed Parts: *(Top Left)* Child's Pail; *(Top Right)* Decorative Mask; and *(Bottom)* Christmas Decoration

Conventional plastic sheet fabrication methods employ techniques adapted from those used in the paperboard field and are limited by the depth of draw which can be obtained without thinning down the wall sections. The process employs matched metal molds which are quite expensive. In addition, the formed shapes are usually restricted to round, square, oval, or other regular geometric patterns.

Vacuum forming is a simple process that requires no heavy equipment or expensive dies, yet provides high production rates and rapid cycles. The process is particularly useful where short runs prohibit the cost of matched metal molds. In fact, the process is economically

feasible for making as few as one or two sample parts, as well as for making thousands of pieces.

Where large parts with relatively thin walls are required, vacuum forming provides the best method of economical production because of its low original equipment costs. Further economics are inherent in the use of low-cost molds that are easy to build or modify, and the use of preprinting to reduce decorating costs.

Applications

The fields of application of vacuum formed plastic parts are widely diversified and include packaging; advertising displays and signs; light diffusion panels, shades, reflectors, lenses, etc.; and novelties and toys (see Figure 4). Appliance parts, such as television receiver masks and refrigerator door liners, drip pans, and trays, are currently being made by vacuum forming of plastic sheets. Another important field of application is in trays and containers of all types, including tote boxes, luggage, typewriter cases, and laboratory trays.

Vacuum forming is also being used to make place mats, furniture components, automobile scuff boards and instrument panels, and other decorative parts, as well as for machine housings, light structural components, radio cabinets, instrument panels and housings, and other industrial parts.

New applications for vacuum forming are being developed constantly, and all indications are that the process will rank with molding as a major method of fabricating plastics.

Summary and Conclusions

Vacuum forming is a simple process that can be used for all types of thermoplastic sheets and requires no heavy, expensive equipment. Relatively low-cost molds are used that are easy to modify or alter and can be built from a wide variety of materials. The process is economically practical for making runs ranging from one or two sample parts up to quantities in the thousands. Parts that formerly required months to reach the production stage now can be set up and run in production quantities in less than one week.

Meetings and Reports

ASTM Committee D-20 on Plastics Holds Fall Meeting

THE fall meeting of Committee D-20 on Plastics of the American Society for Testing Materials was held September 28-30 at the Haddon Hall Hotel, Atlantic City, N. J. Following the custom of previous years, the meeting was held in conjunction with the Society's Committee D-9 on Electrical Insulating Materials, which met September 30 to October 2.

An attendance of approximately 55 members and other interested persons was present at the D-20 meeting, which consisted of section meetings on September 28 and subcommittee sessions on the remaining two days. In the absence of the Committee chairman, R. K. Witt, Johns Hopkins University, Vice Chairman F. W. Reinhart, National Bureau of Standards, presided over the sessions and was assisted by Secretary G. M. Armstrong, Eastman Chemical Products Co.

Committee D-20 Meeting

The full committee meeting was held September 30 at the close of the morning session, with some 40 members present. A report of the advisory committee meeting, held the previous evening, was given by Mr. Armstrong. Study groups set up by the advisory committee recommended that the Society's board of directors be asked to form a coordinating group with the Society of the Plastics Industry, Inc., to work on standards for plastic pipe, and to organize a joint committee of D-20 and other interested ASTM groups to work on standards for plastic coated fabrics. Both actions were approved by D-20 members.

Other advisory committee actions that were approved included the establishing of overall attendance lists at future meetings and eliminating the need of lists by the various subcommittee sessions; and the mailing of a questionnaire to all D-20 members to determine their interest in the different subcommittees.

It was announced that the spring meeting of D-20, held in conjunction with D-9, would take place on March 22-24, 1954, at the Roanoke Hotel, Roanoke, Va. The next meeting of D-20 would be part of the Society's annual meeting in Chicago, Ill., on June 14-18. Tentative plans for the Fall, 1954, meeting call for Cleveland, O., about September 21.

Subcommittee Meetings

Subcommittee I—Strength Properties, R. M. Berg, Carbide & Carbon Chemicals Co., chairman. The proposed revision of D882-49T, on Tensile Properties of Thin Plastic Sheets and Films, is to be sent to letter ballot of the subcommittee. Negative votes received in the ballot on the proposed revision of D256, on impact strength, could not be resolved, and it was decided to rewrite the revision and submit it to another letter ballot of the subcommittee. Section L, on bursting strength, is being reactivated to work on a method for plastic pipe. A round-robin testing program is planned on stiffness of films 10 mils or less in thickness. Studies will be made of a proposed revision to D747, on flexural stiffness, and the need of test methods on fatigue resistance and creep of structural rigid plastics.

Subcommittee II—Hardness Properties, H. L. McChesney, Monsanto Chemical Co., chairman. Copies of the recent report on the British Admiralty hardness tester[1] by the Brooklyn Navy Yard Material Laboratory will be distributed to the members of the indentation hardness section (Section A) for study. Laminators will be contacted to determine the need of a test method on scratch resistance of laminated plastics. A round-robin test program is planned to determine the possibility of preparing a quantitative test method for blocking resistance of plastic sheets. Results on the letter ballot for the proposed revision to D1044, on optical effects of abrasion resistance, are still incomplete. If no negative votes are received, the revision will be sent to D-20 letter ballot.

[1] See our Oct., 1953, issue, p. 61.

Subcommittee III—Thermal Properties, C. H. Adams, Monsanto, chairman. A round-robin test program is planned to investigate a proposed method for determining melt viscosity based on the parallel plate plastometer. Copies of the Celanese test method for determining the softening points of thin sheets, and a bibliography of literature on second-order transition temperatures of plastics were distributed and discussed as the basis of a future test program on softening points. The proposed revision of D731, on the molding index of thermosetting powders, has passed the subcommittee and will be sent to a letter ballot of D-20. Unreconcilable negative votes were received on the proposed revision of D746, on brittle temperature. The revision will be rewritten and sent to a simultaneous letter ballot of the subcommittee and D-20.

Subcommittee IV—Optical Properties, G. W. Ingle, Monsanto, chairman. Reports were given of work in progress by Committee D-1 on the precision of color-difference measurements by various instruments; and by the NBS on the preparation of haze standards made of glass laminated plastics. The need of a comprehensive goniophotometric method for determining gloss is being studied.

Subcommittee V—Permanence Properties, J. W. Mighton, Dow Chemical Co., chairman. Information is being gathered on the various weathering methods now in use. Comments are being sought on the proposed revision of D570-42, water absorption test, to remove the initial weighing requirement, and to add a note that the test method does not provide complete water absorption data or give an equilibrium value. The need of a method to deter-

mine the wet strength of reinforced plastics is being studied. A round-robin test program will be started soon to determine the effect of specimen shape (bar *versus* disk) in the test method for thermosetting shrinkage. Section H, on outdoor exposure, is studying the Picatinny Arsenal method as the possible basis for a standard procedure.

Subcommittee VI — Specifications, Lucius Gilman, Picatinny Arsenal, chairman. A proposed revision of D700, on phenolics, is being studied to include rubber-phenolics. Work has started on a revision of D708, vinyl chloride-acetate sheets, to include the newer types and grades of copolymers now available. The proposed revision of D702, on cast methacrylate, is being sent to subcommittee letter ballot. Plans are under way for a revision of D788, on methacrylate molding compounds. The need of a deformation under load requirement in D787-52T, on ethyl cellulose molding compounds, is being studied. A proposed specification for types and grades of non-rigid vinyl plastics is being circulated for comments. Work is in progress on the preparation of a specification for halocarbon plastics. The subcommittee asked the advisory committee to consider the need of a specification for glass reinforcements and finishes used in low-pressure laminates.

Subcommittee VII — Analytical Methods, H. E. Riley, Bakelite Co., chairman. Method D793-49, on stability at high temperatures of chlorine-bearing plastics, is considered too complicated and lengthy for practical use. The possibility of evolving a quicker test method, based on color change, is being studied. Paul Willard, Ohio-Apex, Inc., was appointed chairman of Section F, on plasticizers, which will determine if a test for heat stability of plasticizers is necessary and feasible. Round-robin testing programs are planned to evolve methods for determining moisture content and particle size.

Subcommittee VIII—Research, C. R. Stock, American Cyanamid Co., chairman. Four papers were presented:

"The Control of Weight Uniformity in Glass Mat by Statistical Methods," G. E. Power, Formica Co. The speaker discussed the statistical control method used by Formica to minimize lengthwise and crosswise variations in glass content of laminated sheet plastics.

"Prediction of Deflection and Stress Distribution in Beams of Plastics Which Creep," W. M. Findley, University of Illinois. The derivation and application of mathematical equations for predicting deflection and stress in beams were discussed and illustrated.

"Measurement of Particle Size Distribution in Vinyl Chloride Resins," R. M. Berg and W. G. Best, both of Carbide & Carbon. Mr. Best described an instrument and test method for determining particle size by means of light transmission through a column of liquid in which the resin is suspended.

"The Potassium Permanganate Test as Applied to Tricresyl Phosphate," J. E. Caldwell and L. Fowler, Monsanto. Mr. Caldwell described a method for quantifying the standard potassium permanganate test for oxidizable substances to eliminate subjective judgments as to color changes, and permit more precise comparisons of materials.

Subcommittee IX—Molds and Molding Processes, J. L. Williams, Dow, chairman. A round-robin program is in progress on the effects of gating and electronic preheating on transfer molding test specimens. A questionnaire has been sent out for comments as to the need of a new mold shrinkage test specimen. Section H has changed its title from "Injection Molding" to "Standard Injection Molding Processes," and comments on future work are being solicited.

Subcommittee X—Definitions, Nomenclature, and Significance of Tests, C. H. Alexander, B. F. Goodrich Chemical Co., chairman. Work has begun on a proposed revision of D675-45, "Standard Descriptive Nomenclature of Objects Made from Plastics," to change the title to "Standard Descriptive Terms Pertaining to Plastics," and revise the list of terms defined. Following a letter ballot of D-20, new definitions of plasticizer, reinforced plastics, filler, A-stage, B-stage, C-stage, and envenomation, will be sent to the standards committee. Definitions for the following terms are being sent to D-20 ballot: gel, blocking, creep, cold flow, bag molding, and delamination. Proposed definitions for the following terms will be sent to subcommittee ballot: non-rigid plastic, semi-rigid plastic, rigid plastic, crazing, catalyst, inhibitor, cure, contact pressure molding, low-pressure molding, high-pressure molding, permanence, and polystyrene.

Subcommittee XIV—Conditioning (Joint with Committee D-9), A. C Webber, E. I. du Pont de Nemours & Co., Inc., chairman. Returns are still incomplete on the subcommittee ballot to revise D618-51T (general conditioning method) to include chambers other than dessicators. If approved, the proposed revision will be sent to D-20 ballot. Work is in progress on the measurement of dewpoint at high humidities by the mirror method, and methods for measuring humidity in small enclosures.

ISO Plastics Meeting in Stockholm

Technical Committee 61 (Plastics) of the International Standards Organization held its third meeting on August 10-14 in Stockholm, Sweden. In addition to five observers, the meeting was attended by 58 delegates representing Belgium, France, Germany, India, Italy, The Netherlands, Sweden, Switzerland, United Kingdom, and the United States. The meeting was arranged by the Swedish Standards Organization in cooperation with the Swedish Plastics Federation and was presided over by Chairman G. M. Kline, National Bureau of Standards.

Working groups on physical chemical properties, mechanical strength properties, thermal properties, chemical and environmental resistance, laboratory atmosphere and conditioning procedures, and nomenclature and definitions met and discussed proposed international standards. Proposals were agreed upon for the following test methods: water absorption; apparent density of molding powders; acetone soluble matter in phenolic moldings; flexural strength properties; and heat distortion temperature. These proposals will be circulated through the member countries by the American Standards Association, which is the secretariat for ISO/TC 61, for their consideration.

Leader of the American delegation was Robert Burns, Bell Telephone Laboratories, and the other delegates were R. Buchdahl, Monsanto Chemical Co.; F. W. Busse, E. I. du Pont de Nemours & Co., Inc.; Dr. Kline; R. K. Witt, Johns Hopkins University; and E. Y. Wolford, Koppers Co., Inc.

Technical Committee 61 on Plastics, ISO, in Session at Stockholm Meeting

SPE Conference Chairmen

G. W. BEATTY, Dow Chemical of Canada, Ltd., will be general chairman of the tenth annual National Technical Conference of the Society of Plastics Engineers, Inc., to be held at the Royal York Hotel, Toronto, Ont., Canada, January 27-29. Acting as co-chairman will be Malcolm Wilkinson, Canadian Industries, Ltd. Subcommittee chairmen for the meeting include: publicity, T. J. Carey, Canadian General Electric, Ltd.; advance registration, J. E. Parkhill, Canadian G-E; ladies' program, G. S. Woolley, Glen S. Woolley & Co.; luncheon, T. A. McLellan, Smith & Stone, Ltd.; printing, G. G. McAllister, *Canadian Plastics;* house, R. H. Strong, Naugatuck Chemicals Division, Dominion Rubber Co., Ltd.; information, J. C. Pavanel, B. F. Goodrich Chemical Co.; and professional activities, Barney Kellam, Ontario Hydroelectric Power Commission. D. E. Ferguson, Canadian Industries, is a member of the program committee, and A. J. McConvey, Canadian G-E, is assisting with publicity work.

Two Speakers at N. Y. Meeting

The New York Section, SPE, held a regular dinner-meeting on October 21 at the Gotham Hotel, New York, N. Y., with some 90 members and guests attending. Two talks were given at the technical session, which followed the cocktail hour and dinner: "Weighed Feeding in the Plastic Industry," by E. A. Buechner, Glengarry Equipment Corp.; and "Araldite Epoxy Resins—Expanding Horizons," by E. N. Dorman, Ciba Co., Inc. The talk on weighed feeding was originally scheduled to be given by J. E. Currie, Glengarry vice president, who, however, was unable to attend this meeting.

Mr. Buechner first reviewed the weighed feeding principle, as applied to injection molding, and gave a brief history of his company's entry into the plastics field with its machine. Operating on the vibratory feeding principle, the Glengarry unit provides adjustable weighed charges accurate to within 0.2-gram and a tolerance of less than 1% at all feeding rates. During the 16 months since the first Glengarry feeder designed for plastics was introduced on the market, units have been installed in 150 molding plants. Automatic in operation, the feeders are currently being made in three hopper capacity sizes to meet a wide range of requirements.

Some of the advantages to be gained by the use of weighed feeding in injection molding include the elimination of short shots and overfeeding; more efficient injection machine operation since the ram goes through full travel with a properly weighed charge; a saving in material averaging 4%; and the reduction of flash, sink marks, and internal stresses in the molded parts. Further work on the feeder is needed to provide self-compensation to adjust for variations in molding cycle. Mr. Buechner concluded his talk with a demonstration of the Glengarry machine in operation.

Mr. Dorman said that epoxy resins, in the uncured form, are characterized by the presence of highly reactive epoxy end-groups separated by alkyl-aryl chains. They are prepared by reacting diphenols with epichlorohydrin to give a thermoplastic product. This product is then further reacted or cross-linked with amines, acid anhydrides, or other hydrogen-releasing agents to give the cured resin. This curing reaction or polymetathesis takes place without the evolution of water or volatile matter, can be accomplished at room or elevated temperatures, depending on the curing agent used, and yields a thermosetting product.

The properties exhibited by the epoxy resins include outstanding adhesion to nearly all materials; extremely low shrinkage during cure; excellent dielectric properties at room and elevated temperatures; high mechanical strength; good chemical resistance; high thermal stability; outstanding water resistance; excellent fungus resistance; easy curing; marked dimensional stability; and no limit as to size of resin castings. Their properties make the resins particularly desirable for bonding, casting, coating, impregnating, and laminating applications.

CALENDAR

Nov. 30-Dec. 1.	Rubber & Plastics Division, A.S.M.E. Annual Meeting, Hotel Statler, New York, N. Y.
Nov. 30-Dec. 5.	Exposition of Chemical Industries. Commercial Museum and Convention Hall, Philadelphia, Pa.
Dec. 3.	Fort Wayne Rubber & Plastics Group. Van Orman Hotel, Fort Wayne, Ind.
Dec. 4.	The Los Angeles Rubber Group, Inc. Christmas Party, Cocoanut Grove, Ambassaor Hotel, Los Angeles, Calif.
Dec. 11.	New York Rubber Group. Christmas Party. Henry Hudson Hotel, New York, N. Y. Boston Rubber Group. Christmas Party. Somerset Hotel, Boston, Mass.
Dec. 12.	Southern Ohio Rubber Group. Christmas Party. Miami Valley Country Club.
Dec. 14-16.	Second Annual Wire & Cable Symposium, Berkeley Carteret Hotel, Asbury Park, N. J.
Dec. 15.	Buffalo Rubber Group.
1954	
Jan. 22.	Philadelphia Rubber Group. Poor Richard Club, Philadelphia, Pa.
Jan. 25-28.	Plant Maintenance & Engineering Show. International Amphitheatre, Chicago, Ill. Conference at Hotel Conrad Hilton, Chicago.
Jan. 27-29.	Society of Plastics Engineers. Tenth Annual Technical Conference, Royal York Hotel, Toronto, Ont., Canada.
Jan. 29.	Akron Rubber Group. Panel Meeting. Mayflower Hotel, Akron, O.
Feb. 2.	The Los Angeles Rubber Group, Inc., Hotel Statler, Los Angeles, Calif.
Feb. 4.	Northern California Rubber Group.
Feb. 10.	Newark Section, SPE, Military Park Hotel, Newark, N. J.
Feb. 17.	Washington Rubber Group. New York Section, SPE, Hotel Gotham, New York, N. Y.
Mar. 2.	The Los Angeles Rubber Group, Inc. Hotel Statler, Los Angeles, Calif.
Mar. 4.	Northern California Rubber Group.
Mar. 10.	Newark Section, SPE, Military Park Hotel, Newark, N. J.
Mar. 17.	Washington Rubber Group. New York Section, SPE, Hotel Gotham, New York, N. Y.
Mar. 22-24.	Committees D-9 and D-20, ASTM. Roanoke Hotel, Roanoke, Va.
Mar. 26.	Boston Rubber Group. Spring Meeting.

President Saul Blitz, Tico Plastics, Inc., announced the appointment of a nominating committee to select a slate of candidates for the three openings on the board of directors to be filled next year. Voting will take place by mail ballot, and results announced at the Christmas meeting. Sam Silberkraus, Riverdale Plastics Development Corp., is chairman of the committee, and the other members are G. B. Baron, Ideal Plastics Corp.; H. H. Dash, Arma Corp.; A. L. GeWertz, consultant; Guy Martinelli, Sylvan Plastics, Inc.; and I. I. Rubin, Robinson Plastics Corp.

Table favors were distributed through the courtesy of Renwal Mfg. Co. and Naugatuck Chemical Division, United States Rubber Co., and the meeting closed with a drawing for door prizes contributed by Leaf Plastics, Inc.; Monsanto Chemical Co.; and A. Schulman, Inc.

Bibliographic Services

THE literature-seeking facilities of Research Information Service, New York, N. Y., an organization devoted to the publication and translation of foreign scientific literature, notably patent literature, are now available to all groups engaged in research and promotional activities in the scientific and industrial fields, including all branches of applied and theoretical chemistry. A recent expansion of the organization's bibliographic research department has enabled the firm to offer this service to the public at large.

Compilation and preparation of the following materials can be obtained: alphabetical or chronological author-title bibliographies; listings according to topical subdivisions; topical indices; bibliographies with abstracts tailored to the client's requirements; complete translations of specific literature; copies of original literature; and periodic lists of titles and/or abstracts on any subject over a limited or indefinite time. The Service also publishes the "Complete Monthly Digest of German Patent Applications" covering chemicals of three general classes: straight-chain organics; ring-type organics; and nitrogen-containing compounds.

Of particular interest is a publication by RIS which lists the translations of German patent applications and manufacturing processes in the field of plastics, which are available from the firm. Included are reports on vinyl polymers and copolymers, polyethylene, acrylics, styrene, silicones, polyamides, polyesters, polyurethanes, and other materials and processes.

Adding to Plastics Division

Loring E. Harkness, Jr., has been named chief industrial engineer of the plastics division of Celanese Corp. of America, 180 Madison Ave., New York 16, N. Y. The department will be engaged in coordinating efforts to improve the efficiency of the manufacturing operation of the plastics plants. Mr. Harkness, recently with Dan River Mills, Inc., was also associated with Aluminum Co. of America for many years.

C. M. Reynolds has been named assistant director of sales of the film department, plastics division. Previously he had been assistant district manager of the Midwest sales territory.

Peter J. Dunn replaces Mr. Reynolds there.

Scientific and Technical Activities

The 1953 Goodyear Medal Award Lecture

The Future of Rubber[1]

John T. Blake[2]

I AM deeply appreciative of the honor given me as a Goodyear Medalist. Through me, my associates must share much of this tribute. I would be less than honest if I did not admit an overwhelming pleasure in the award.

It so happens that this particular meeting of the Rubber Division completes 30 years of my membership in our organization. I have missed very few meetings of the Division during this period, and, therefore, I have listened to something over a thousand technical papers. I may have forgotten the details of some of them. What I have not forgotten is the formation of a large number of personal friendships at Rubber Division meetings. These I prize most highly, and I like to regard them as my principal accomplishment of the last 30 years.

The question that I considered for some time was what to talk about on the present occasion. I could have chosen to give a technical paper on some original work in the field of rubber, but this idea did not appeal particularly to me, and I was afraid it might not interest you. The second possibility would have been to discuss in some detail a specific phase of rubber chemistry such as vulcanization, oxidation, or reinforcement, with the latest theories and facts in the field. Others have done this—probably more successfully than I could do with the limited time available. The other possibility was to talk in more general terms. For better or worse I have chosen to talk on *The Future of Rubber*.

It has been said rather appropriately that the future is only an extension of the past. The only way *I* know of looking ahead is to examine the past and then to extend it by extrapolation.

We have been warned recently by Satchel Paige, the ancient St. Louis pitcher, who said, "Don't look back. Something might be gaining on you."

I know what he meant. It has been gaining on me for a long time. I am also aware of other dangers. It has been said that there are fools, damn fools, and those who extrapolate. Nevertheless I shall take this chance.

Looking backward I remember two adventures in predicting the future that bring smiles in the light of subsequent events. In the early Twenties the best statisticians in the petroleum industry viewed our limited petroleum supply with anxiety. They predicted that our maximum production of this material would occur in 1926. From that date onward petroleum would become scarce and thereafter be a high priced and very rare material. There was some guessing that the automobile might almost disappear in the Thirties.

Girard, in France, discussed in a similar vein the coming crises in our rubber supply. He predicted that within a few years demand would outrun supply to such an extent that rubber would be precious and high priced. Almost simultaneously the chairman of the Rubber Growers Association in England predicted that we would have very cheap rubber for years to come. Both were right because not long afterward rubber soared to $1.20 a pound and then tumbled to a low of $2\frac{3}{4}$c. This shows how far a prophet can get his neck out.

If, as I have said, the future is an extension of the past, we might get some idea of where we are going by having a quick look backward at where we have been. There have been astounding technical changes in our industry since I entered it. We have approximately 300 members in our 25-Year Club who will remember these changes. This means that there are nearly 3,000 members of the Division, however, who are not personally familiar with the happenings during this whole period. If those of you who are as ancient as I am will bear with me, I should like to look at the situation as it was 30 years ago.

A Look Back—Rubber Technology

At that time we were just coming out of what some might call the dark ages of the rubber industry. We were beginning to make real technical progress. Up to then passenger tires carried air pressures of 50 to 75 pounds. The 30 by $3\frac{1}{2}$ tire was the popular size, and a balloon tire with a 4.40 cross-section was beginning to replace it. In 1920 two tires on our family car were completely worn out at 2,200 miles. Two years later our new tires were guaranteed for 5,000.

One of the big complaints in those days was that automobile tires made too much noise. In the next 25 years that trouble was gradually eliminated, but tires became unsatisfactory for winter weather. Now the pendulum has swung back, and today we use snow treads resembling the tires we were trying to get rid of.

In our own factory the common practice was to use rubber compounds containing litharge as the only accelerator. We thought we were very progressive because some of our stocks contained beta-naphthylamine as a combination accelerator and antioxidant. Only a few materials were being sold commercially as organic accelerators. The prominent ones were DPG, paraldehyde, thiocarbanilide, and lead oleate. Two of the commercial accelerators, aniline and para-phenylenediamine, make us shudder now because of their toxicity. Doc Somerville was beginning to try to convince the industry that Tuads was a good thing to have in a rubber compound, and the price was only $9 a pound. We have seen many new, versatile, and effective organic accelerators since then, and there are going to be better ones.

It was at my first meeting of the Division that the oxygen bomb was announced. At that time the Geer oven test was still new. These accelerated aging tests, which have been joined by so many others, have been the tools that have allowed us to improve remarkably the resistance of rubber compounds to deterioration by oxidation. A rubber which lost only about 50% of its tensile and elongation after four days in the Geer oven at 158° F. was top quality in those days. Today we have vulcanized rubbers which can withstand months at 250° F. without losing their rubbery characteristics. We can calculate that this improvement is several thousandfold, which is a lot of improvement. Much of this has occurred in the last ten years. I believe, therefore, that not too far in the future we shall have materials which are almost completely proof against oxidation as we have known it.

It is difficult, of course, to distinguish in practice heat aging from oxidation since the two are virtually inseparable. Where we used to think of heat as the enemy of rubber, we meant only a few degrees above room temperature. Today heat often means several hundred degrees higher.

Thirty years ago we had available only one polymer and one vulcanizing agent, natural rubber and sulfur. When these two were heated together, and vulcanization took place, it was considered a unique change. The transformation by heat of a plastic and adhesive mass into a dry elastic material fascinated me, and I am still intrigued by it. As time has gone on, we have found that vulcanization is not a specific reaction, but a very general one. Today we have many polymers, with all sorts of chemical structures, which can undergo this reaction. We know now that, roughly speaking, any long-chain polymer with active groups can be vulcanized.

To go with these new polymers we have discovered a host of vulcanizing agents. We now can make use of other active chemicals of an entirely different character. If we look back over the last 30 years it is evident that the pace is speeding up. We are evolving many new types of rubber and their attendant cross-linking agents. I am sure that many new vulcanization systems will be developed in the future which will give us materials whose properties will be far superior to anything we have seen. The word *rubber* is going to have less and less of its original meaning.

A Look Ahead—Rubber Technology

There are going to be many more types of polymers produced in the future than we

[1] Presented before the Division of Rubber Chemistry, A. C. S., Chicago, Ill., Sept. 10, 1953. Reprinted in part from *Chem. Eng. News*, Oct. 19, 1953, p. 4290.

[2] Director of research, Simplex Wire & Cable Co., Cambridge, Mass.

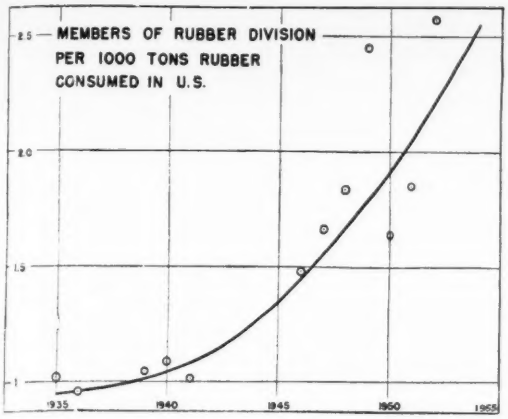

Fig. 1

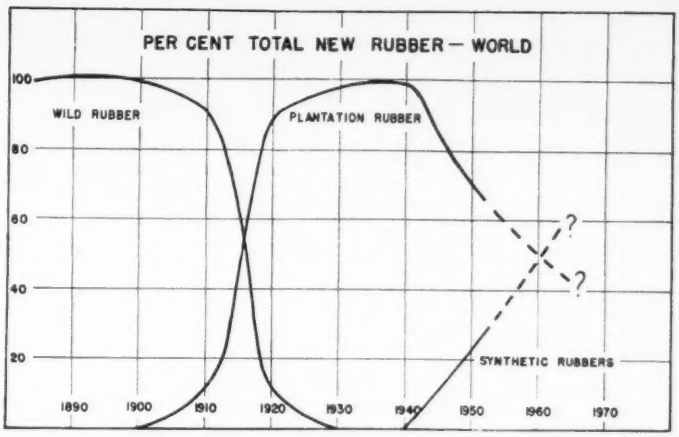

Fig. 2

dream of today. There has been much talk of rubbers tailor-made for specific purposes. The picture has been painted of a chemist designing on paper a molecular structure for a particular use and then from this proceeding to make the tailor-made rubber. This is just the opposite of what actually happens. What he really does is to synthesize an ever-increasing variety of rubbers and then test them to see if they are better adapted for a given use than their predecessors. The end result is the improved special rubber, but it is not a tailor-made product.

The extension of synthetic rubber by oils and resins is a major advance of the last two years. Progress has just started. As we find out how to make higher and higher Mooney polymers without cross-linking, these improvements will be extended tremendously. Workers with polymers other than GR-S will find this a most fruitful field of endeavor.

Thirty years ago there were only two reinforcing fillers, carbon black and zinc oxide. The carbon blacks available then were bone black, lamp black, and channel black. The latter was sold in a fluffy condition. Some enlightened people were attempting to sell a compressed product. The mill man got just as black from it, but it took a little longer. Reinforcing furnace blacks were unknown. In the past decade these have replaced channel blacks to such an extent that today over three-quarters of our reinforcing blacks are made by this relatively new process.

Our best reinforcing agent is still carbon black.

We rubber chemists emulate Henry Ford, Sr., when he said of his automobiles, "You can have any color you want as long as it is black."

We are making great strides in improving clays and in developing other reinforcing fillers. I predict that not too far in the future we may have colored rubbers which will be as tough as black compounds are today.

Many rubber chemists have the ambition to furnish tires which will last the life of an automobile. Work with the new isocyanate rubbers, the new fabrics, and new reinforcing fillers leads me to predict that the lifetime tire is not far away although the particular materials may still lie in the future.

I have predicted a number of advances that I am sure are going to happen in the future. The members of the Rubber Division are going to produce them.

I thought it might be interesting to speculate on the future of the Rubber Division. In Figure 1, I have plotted the number of members per thousand tons of natural and synthetic rubber consumed in the country. It is obvious that there is a rising trend. Instead of one member being associated with the use of a thousand tons, now two technical people are necessary. The trend emphasizes the growing technical complexity of rubber manufacturing. We all know that our usage of rubber is increasing; so I can predict a prosperous future for the Division.

The Rubber Supply Situation

I have considered some of the technical aspects of the future of rubber. Let us turn to the supply situation. What happens in our industry will depend on the kinds and quantity of the rubbers that will be available. It is appropriate that we discuss this subject at the present time because in one respect the rubber industry is at a crossroads. Since 1941 the national government has either controlled the industry completely in its use of rubber or has been the principal factor in our rubber supply. Over two-thirds of the Rubber Division members, therefore, have never known any other system.

There is now a real prospect that our industry may soon be again the sort of free enterprise that has contributed greatly to its remarkable success and growth. The compromises by which the present rubber legislation was passed raise some doubts, however, as to whether plant disposal will take place on schedule. Many of the politicians feel that industry should not be trusted with the production of synthetic rubber. I see no reason why the government should own this industry any more than it should own steel, chemical, coal, or automobile manufacturing.

The transition from government ownership to private enterprise will not be an easy one. There will probably be dislocations in our rubber supply during the shakedown period. We must replace government research in the field of synthetic rubber by the competitive research of private industry. I am confident that the restoration of synthetic rubber research to this basis will produce more rapid advances in our technology and science than we have seen even in recent years.

Our industry has had three phases in its supply of rubber. In Figure 2, I have plotted data on each of the three kinds of rubber, wild, plantation, and synthetic, as a percentage of the total supply. I think the conclusions are self-evident. Our industry began with wild rubber, and for about a century it was the only raw material. This era ended in effect between 1910 and 1920. The plantation phase replaced it in this decade and started to end in 1940. Today the synthetic era is well advanced.

Let us look at the future supply of rubber from the point of view of quantity. In Figure 3, I have plotted the consumption of new rubber in the United States for the past hundred years. I have done it on a semi-log basis because this device indicates the trend rather clearly. Back in 1850 there were only 1,000 tons of rubber consumed in the whole country for the whole year. Today one manufacturer uses approximately this amount each day.

For the first 60 years of this plot, disregarding the minor fluctuations, rubber consumption followed a straight line on the logarithmic basis. Use doubled in successive equal periods of time, which was about every 12 years. Between 1910 and 1920 there is a disturbance in the plot, and the increase in consumption of rubber was at a much greater rate. This was undoubtedly due to the rapid development of the automobile industry during the period. From about 1920 to the present, use has again proceeded on a substantially straight line nearly parallel to that representing the first 60 years. We now have a doubling of consumption about every 13 years. Of course there is some fluctuation about these trend lines. The curtailed consumption during the war is obvious, but the straight-line trend seems to be indicated clearly.

In Figure 4, I have shown the consumption of rubber per person in the United States during the past hundred years. It follows the same sort of trend. It is amazing to go back and find that in 1850 there was an annual usage in the country of only a little over an ounce of rubber per person. This has multiplied about two hundredfold in a century so that today each man, woman, and child consumes per year nearly 20 pounds of rubber.

Various attempts have been made to estimate the amount of rubber that will be consumed in the future. Although the data that I have shown seem to indicate a straight-line function on a semi-log plot, obviously this rate of increase cannot persist indefinitely. We have the saying that, "A tree doesn't grow to the sky," and so it must be that our use cannot increase indefinitely on this basis.

There are numerous equations for extrapolating data of this sort. They have been applied to commodities other than rubber with good success. The Gompertz and Pearl-Reed equations are the most prominent of these and are shown below.

GOMPERTZ EQUATION

$$\log Y = \log K + ab^x$$

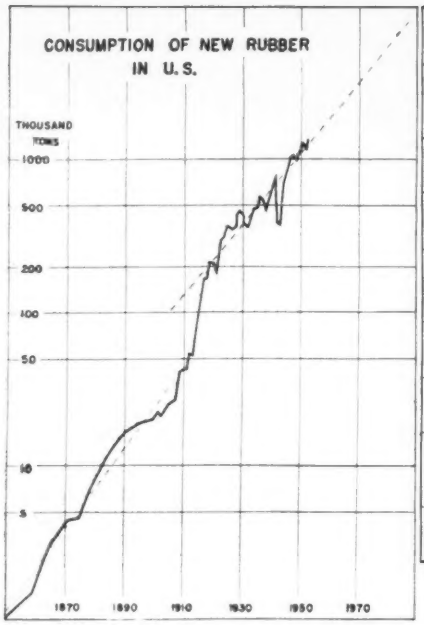

Fig. 3

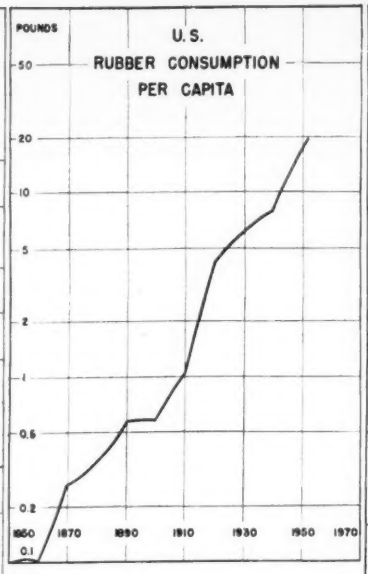

Fig. 4

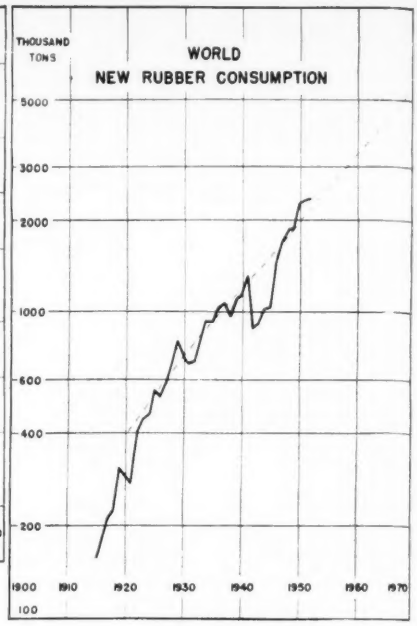

Fig. 5

PEARL-REED EQUATION

$$Y = \frac{K}{1 + e^{a+bx}}$$

The use of either of these equations to predict consumption in the next two or three decades gives results which are, surprisingly enough, little different from those obtained by the straight-line relationship. Predictions cannot be made precisely for any particular year because business conditions at that time modify such conclusions. This is of little concern to us at the minute since it is the long-term trend in which we are interested.

This possibility of our consumption doubling in the next 13 years and quadrupling in about the next 25 scares me. Thirty years ago it wouldn't have been so bad because the amounts were smaller. Where are these immense quantities of rubber going to be used? Obviously I don't know. If the so-called "rubber roads" were to be adopted universally, probably consumption would try to double overnight. Foam rubber usage is growing rapidly, as is the use of rubber in paints. We have some reason to believe the rate of growth will continue because the history of the last hundred years cannot be ignored.

I have plotted in Figure 5 the total consumption in the world for recent years, and we have the same general picture.

Rubber consumption is composed today of both natural and synthetic rubber. The question arises as to where these immense quantities of rubber are coming from in the future. Is natural rubber, which was our sole source of supply up to ten years ago, going to be the principal raw material of our industry? In Figure 6, I have plotted the world consumption figures for natural rubber for the past 35 years, and it is evident that an entirely different picture prevails. The shape of the curve makes it seem probable that the consumption of natural rubber is rapidly reaching maturity.

Applying the Gompertz and Pearl-Reed equations seems to confirm this idea. This is perhaps understandable because plantation rubber can be grown successfully only within five or possibly ten degrees of the Equator, and thus the available land areas are limited. In addition, the growing of natural rubber requires a tremendous expenditure of labor. These tropical areas do not have the necessary population to expand the growing of natural rubber much further. In Malaya the native labor necessary for even the present quantities of rubber has been entirely inadequate. In order to obtain the rubber that has been produced in the past 25 years there has had to be a rather extensive importation of labor. It has been drawn from the two big reservoirs of the world, India and China.

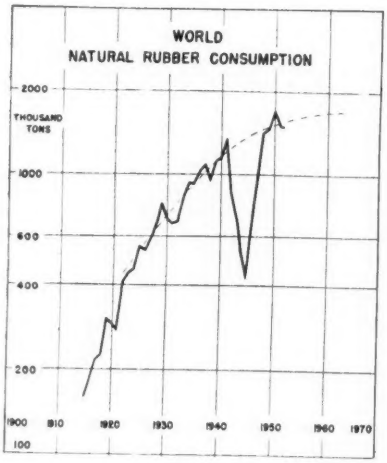

Fig. 6

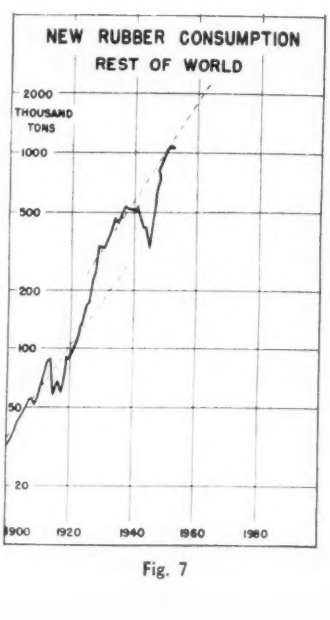

Fig. 7

With the high prices for natural rubber in late 1950 and early 1951 we can be quite sure that every pound that could be produced was obtained. In spite of the fact that there is an extensive replanting program in the Far East it appears to me that the world is close to its maximum production of natural rubber, and it is possible that the peak may have been passed.

I expect the world will continue to produce large quantities of tree rubber, but it must be recognized that uneconomic conditions are approaching. Natural rubber is selling today for less than it was 30 years ago. Yet in the meantime prices of the two raw materials necessary to those involved in the actual production of natural rubber: namely, cotton cloth and rice, have increased severalfold, and the efficiency of production has not improved greatly.

The output of natural rubber in recent years has not been equal to world demand for rubber, and it never will be equal again. We have many examples in history of the replacement of natural products by synthetic organic chemicals. I need mention only synthetic indigo, alizarin, vitamins, and hormones to illustrate this point. I believe firmly that the future of the world and particularly that of the United States lies in the field of synthetic rubber. The present raw materials are available in the form of petroleum, and the necessary labor is so small that this does not restrict expansion.

Where will this synthetic rubber production be located? Its manufacture requires a technically advanced, extensive, and active petroleum industry. Of the commercial countries of the world we stand

alone in this respect, and in "we" I include Canada. If it were not already our inclination, we would be compelled to lead the world in the field of synthetic rubber. We must do this if we are to have rubber to meet the predicted demands. Obviously it is possible to produce synthetic rubber in the petroleum areas of the Near East and the Far East, but these peoples do not yet have our necessity.

The rest of the world has used synthetics as only a comparatively small percentage of its rubber. For political considerations and perhaps economic ones they have preferred to stay with natural rubber. We on this continent will have available to us from now on less and less natural rubber because of the increasing world demand and the substantially constant production of the natural product. We will be forced to use synthetic rubber because the rest of the world will demand the natural product as long as possible. At some time in the future the supply of natural rubber will not be great enough to take care of the rest of the world even if we are on a 100% synthetic basis. I have calculated the consumption of rubber in the balance of the world for the past 50 years, and this is plotted in Figure 7.

The "Future of Rubber"

A rough inspection shows that by about 1960, which is only a few short years away, the demand for rubber in the rest of the world will equal the total supply of natural rubber even if this country gets none. From then on everybody must learn to use some synthetic or not have enough. The United States and Canada must furnish this synthetic rubber unless the other petroleum centers take on the job.

In the days before our possession of a synthetic rubber industry the widely fluctuating prices of natural rubber were a real headache to manufacturers. Many times the overall profits of a factory were controlled more by inventory profits and losses in rubber than by its manufacturing operations. The presence of synthetics has given us a comparatively stable price for rubber. It is true that this did not work too well in the early part of the Korean war. Because of the inflexibility of government operations we got caught with our plants down. It is safe to say that when synthetic rubber is returned to private industry, manufacturers will no longer need to gamble on their principal raw material as they had to before the war.

Today synthetic rubber is the preferred material in many branches of our industry. As an illustration, my own company has used no more than 5% of its rubber as natural since 1946. It would take a fairly large price differential in favor of natural rubber for us to return to its use. Even then, we would do this with great reluctance because we have no wish to manufacture inferior products. This situation is true in many other branches of the industry. We must improve the quality of synthetics for reasons of national security so that they are the preferred material for all purposes.

It is no longer a question of whether synthetic rubber can stand on its own feet. Within three or four years, depending on who does the extrapolation and which crystal ball is used, this country will need additional synthetic rubber production. It takes time to build plants, and we must anticipate these needs. The American rubber industry welcomes this challenge, and it will produce sufficient quantities of new materials of superior quality and at a reasonable price.

We have come a long way in 30 years, and the pace is accelerating rapidly. I believe that we have made more progress in the last ten years than in the previous 30 or 40. There is little doubt that the next decade will be even more fascinating. We can expect many radical changes in our technology, with many new materials and substantial improvements in the ones we know now.

It was a very satisfying privilege to work in the rubber industry in the years that have passed and to participate to a small extent in the remarkable developments of this era. I am looking forward to the extraordinary advances which I feel sure are not far in the future.

ASME Rubber & Plastics Division's New York Meeting

THE Rubber & Plastics Division of the American Society of Mechanical Engineers will hold two half-day technical sessions on rubber on November 30, and two half-day sessions on plastics on December 1, at the Hotel Statler, New York, N. Y., as a part of the annual meeting of the parent Society. The chairman of the Division is M. E. Lerner, *Rubber Age*, and the secretary, A. G. Gifford, Lord Mfg. Co. For each meeting, however, separate chairmen and vice chairmen for each of the technical sessions are appointed.

The program on rubber and on plastics includes papers of considerable interest to technical men in both industries and attendance of those not members of the Society is encouraged. Details of the technical sessions follow:

MONDAY MORNING—NOVEMBER 30

Chairman, S. W. McCune, III,
E. I. du Pont de Nemours & Co., Inc.
Vice Chairman, James B. Johnson,
Linear, Inc.

9:30 a.m. **"Synthetic Rubber Protects the Navy's Propeller Shafts."** E. A. Bukzin, Bureau of Ships, Department of the Navy.

"Latexing and Hot Stretching of Tire Cord, with Special Emphasis on Nylon." C. A. Litzler, C. A. Litzler, Inc.

"Modern Rubber Calendering Equipment." N. J. Elder, Adamson-United Co.

MONDAY AFTERNOON—NOVEMBER 30

Chairman, P. D. Brass,
United States Rubber Co.
Vice Chairman, H. W. Greenup,
Pilgrim Latex Thread Co.

2:30 p.m. **"Dynamic Characteristics of Silicone Rubber."** G. W. Painter, Lord Mfg.

"Mechanical Properties of Polysulfide Rubbers." Joseph S. Jorczak, Thiokol Corp.

"Selected Rubber Literature References for the Mechanical Engineer—July, 1952-June, 1953." Leora Straka, Goodyear Tire & Rubber Co., and Betty Jo Clinebell, Rubber Library, University of Akron.

TUESDAY MORNING—DECEMBER 1

(Joint Session with Machine Design Division)
Chairman, Prof. R. K. Witt,
Johns Hopkins University
Vice Chairman, A. C. Webber, du Pont

9:30 a.m. **"Viscosity of Polymethyl Methacrylate; An Experimental and Analytical Study."** James K. Knowles and G. H. Dietz, Massachusetts Institute of Technology.

"Reinforced Plastic Laminates for Aircraft Use." D. Rosato, Wright Air Development Center, Wright-Patterson Air Force Base.

Machine Design Division Paper.

TUESDAY AFTERNOON—DECEMBER 1

Chairman, C. H. Adams,
Monsanto Chemical Co.
Vice Chairman, Norman A. Skow,
Synthane Corp.

2:30 p.m. **"Speedylectric; The Electrode Boiler—A New Method of Supplying Heat to Calenders and Platens."** Bradley C. Higgins, Livingstone Engineering Co.

"New Developments in Liquid Heating of Plastics Processing Machinery." Paul L. Geiringer, American Hydrotherm Corp.

"Selected Plastics Literature References for the Mechanical Engineer—July, 1952-June, 1953." Paul O. Powers, F. W. Elliott, J. K. Stevenson, K. E. Jackson, and J. R. Kelly, Pennsylvania Industrial Chemical Corp.

High Polymer Forum

THE fifth Canadian High Polymer Forum will be held in London, Ont., on November 19 and 20. D. P. Riley, of the Royal Institution of London, England, will address the Forum. A group dinner, visits to the University of Western Ontario and to local industries, and presentation of the below-listed papers make up the planned program.

"Application of Theoretical Dilute Solution Viscosity Equations to Commercial High Molecular Weight Copolymers," R. B. MacFarlane and L. A. McLeod, Polymer Corp., Ltd.

"Stress - Temperature - Time Studies through the Second-Order Transition Region," and "Measurements of the Dynamic Shear Modulus in Solid Polymers at Ultrasonic Frequencies," D. G. Ivey, University of Toronto.

"The Kinetics of the Thermal Decomposition of 2,2-Bisazoisobutyronitrile," M. Talât-Erben and S. Bywater, National Research Council of Canada.

"The Oxidative Degradation of Polystyrene, Polybutadiene, and Polysar," D. Graham and C. Sivertz, University of Western Ontario.

"The Thermal Degradation of Carrageenin," C. R. Masson and A. N. O'Neil, National Research Council of Canada.

"The Mechanism of Depolymerization," L. A. Wall, National Bureau of Standards.

"A Comparison of the Flow of High Polymers in the Cavity of a Mooney Plastometer," D. S. Fenson, Ridley College.

"The Preparation of Ion Exchange Resins," I. H. Spinner, J. Ciric, W. F. Graydon, University of Toronto.

"The Effect of Solubilization on the Size and Interaction of Polysoap Molecules," U. P. Strauss, Rutgers University.

"Heats of Combustion of Organo Silicon Compounds and Polymers," V. B. Goldblum, L. S. Moody, F. E. Satterthwaite, General Electric Co.

"Contact Angle Measurements on Latex Films and Their Relationship to the Constitution of Latex," W. Rupar and H. L. Williams, Polymer Corp.

"Phenyl Monosulfide Copolymer Resins," A. D. Macallum.

"The Structure of Butadiene Dimers Produced by Free Radical Catalysis," L. Gendron and R. V. V. Nicholls, McGill University.

"Photosensitized Polymerization of Acrylonitrile in Aqueous Solution Employing Ion Sensitizers," D. James, Cambridge University.

"The Studies of the Relationship of the Huggins k' to Molecular Structure of Diene Copolymers," L. H. Cragg, McMaster University.

"Ionic Polymerization; Ion Pair Chain Mechanism; and Retardation and Chain Transfer in the Styrene System," C. G. Overberger and G. F. Endres, Polytechnic Institute of Brooklyn.

"The Adsorption of High Polymers," R. Simha, New York University.

"Assignment of Structure to Cellulose-3,6-Dicitrate," E. L. Falconer and C. B. Purves, McGill.

Meeting on Quality Control

THE fall meeting of the New York Rubber Group was held at the Henry Hudson Hotel, New York, N. Y., October 16, and featured a talk, "An Approach to Quality Control," by Simon Collier, of Johns-Manville Corp., and former chairman of the Group. In connection with his talk Mr. Collier showed a 40-minute color film which Johns-Manville uses to train employes in the basic principles of the subject. In addition, Profs. Ellis Ott and Allen Crawford, of Rutgers University, were on hand to assist Mr. Collier in answering questions from the floor.

The chairman of the Group, George N. Vacca, Bell Telephone Laboratories, presided and at the beginning of the afternoon session announced the results of the work of the nominating committee, headed by Arthur J. Lang, H. V. Hardman Co., for officers and directors for 1954. These nominations were as follows: chairman, Joseph Breckley, Titanium Pigment Corp.; vice chairman, S. M. Martin, Thiokol Corp.; secretary-treasurer, Peter P. Pinto, *Rubber Age;* and sergeant-at-arms, John B. Barr, United Carbon Co. Nominated for directors for a three-year term were Henry J. Peters, Bell Labs; Donald F. Fraser, Rodic Chemical & Rubber Co.; Leon Werling, Manhattan Rubber Division, Raybestos-Manhattan, Inc.; and Doran E. Sauser, B. F. Goodrich Chemical Co. The nominations were accepted, and officers and directors elected by a voice vote.

In his talk Mr. Collier first mentioned the work of Walter Shewhart at Bell Telephone Laboratories, who pointed out in 1923 that by the use of certain laws of probability, industry might do a better job in its manufacturing operations. World War II finally brought about a very considerable use of quality control methods by the government, and industry is making increased use of these techniques. At Johns-Manville the quality control group headed by Mr. Collier is responsible for the investigation of all quality complaints.

By means of motion-picture studies of production operations it was possible to demonstrate the reasons for high rejects in many cases and secure the cooperation first of the production manager and then of the workers in installing quality control methods for reducing these rejects.

In the motion picture shown at the meeting it was illustrated how test results on samples taken from the production processes themselves provide the means of establishing control limits, the range of which are then set, based on mathematical as well as economic principles. It was also demonstrated how arbitrarily set control limits may sometimes be too narrow for a given process, and that the limits must be either broadened or the process improved if the original limits are necessary for economic reasons.

Following the movie Dr. Ott, professor of mathematics and applied statistics at Rutgers and a consultant on statistical quality control to many leading manufacturing corporations and the government, and Mr. Crawford, assistant professor of applied statistics at Rutgers and also a consultant in the field, assisted Mr. Collier in answering questions from the floor.

It was pointed out that, in general, it could be assumed that about half the cost of instituting a quality control system in a manufacturing process could be recovered from the improved operating efficiency. The American Society for Quality Control was recommended as a good source of information for those interested in learning more about the techniques and value of quality control methods.

More Outing Reports

Varied Program for Conn. Group

THE eighth annual outing of the Connecticut Rubber Group was held October 3 at the Patterson Club, Fairfield, Conn. Golf, horseshoes, softball, and egg throwing comprised the day's program, with ample food and drink for all. Door prizes were distributed among the 185 attending members and guests.

The committee in charge of the outing was headed by D. McKean, of Whitney Blake Co. Winners in the various games of skill included: *egg throwing*—G. Jerolman and J. Florio, both of Armstrong Rubber Co.; *softball*—first place to Armstrong-Norwalk Rubber Corp.; and *golf*—low net score, L. Manna, of Sponge Rubber Products Co.; and low gross score, F. F. Salamon, of F. F. Salamon Co., and W. Maguire, of United Carbon Co.

Buffalo Group Winners

THE summer outing of the Buffalo Rubber Group was held last June 16 at the Transit Valley Country Club, with 68 persons attending. The various athletic events of the day and the first-prize winners follow: *golf*—low gross, M. Hickey; high gross, A. Koper; low net, A. Dantino; and high net, R. J. Mayer, Hewitt-Robins, Inc.; *egg throw*—H. G. Harris, New York Rubber Co., and J. Missert; *fungo* and *ball throw*—R. Wallace; *ball game*—won by the Out-of-Towners, captained by H. M. Brubaker, Witco Chemical Co.

Hold Mock Patent Trial

A MOCK patent interference trial on a method of making a reinforced concrete bridge highlighted the October 2 dinner-meeting of Detroit Rubber & Plastics Group, Inc. Approximately 150 members and guests attended the session, held in the Detroit Leland Hotel, Detroit, Mich.

The legal skit, entitled "Who Is the First Inventor," was prepared by J. G. Jackson, of the Philadelphia Patent Bar, and was staged with sound recordings and slide illustrations to cover all important points on patent law. Attorneys for the contestants were G. W. Talburtt, of the Chrysler Corp. patent department, and P. F. Seibold, of Harness, Dickey & Pierce. Presiding over the trial was A. F. Lederle, chief judge of the United States District Court, Eastern District of Michigan. The trial proceedings were well planned and both entertaining and educational, and the final vote of the audience was very close. The program was arranged by W. H. Gross, United States Rubber Co., in cooperation with the Michigan Patent Law Association.

V. H. Vodra, of Wyandotte Chemicals Corp. and the Group's educational chairman, announced that 150 men attended the initial course in rubber technology held last spring at Wayne University. Approximately 50 are registered for the same course this fall, and some 25 men applied for the advanced course.

Boston Hears Drogin and Blake

THE fall meeting of the Boston Rubber Group took place October 16 at the Somerset Hotel, Boston, Mass., with Chairman A. W. Bryant, Binney & Smith Co., presiding. As in the past, the meeting consisted of an afternoon technical session, a dinner, and an after-dinner business session and speaker.

Approximately 180 members and guests were present at the afternoon session when two talks were presented: "Extrusion Factors of Black Rubber Compounds," by I. Drogin, United Carbon Co., Inc.; and "The Future of Rubber," J. T. Blake, Simplex Wire & Cable Co. Both talks had been given previously at the September meeting of the Division of Rubber Chemistry, A. C. S., in Chicago. An abstract of Dr. Drogin's paper, a somewhat expanded version of the paper by himself, H. R. Bishop, and P. Wiseman, appeared in our August issue.[1] Dr. Blake's paper, the 1953 Goodyear Medal Address, appears in this issue.[2] The Medalist was introduced by J. C. Walton, Boston Woven Hose & Rubber Co. and Rubber Division chairman, who performed a similar service at the Rubber Division meeting.

In the business session, following the dinner which was attended by 440 members and guests, Mr. Bryant announced that R. K. Patrick, Vulplex, Inc., will be chairman of arrangements for the Group's annual Christmas party, to be held at the Somerset Hotel on December 11. B. H. Capen, Tyer Rubber Co., presented the report of the nominating committee. This report was accepted as read, and balloting for new officers will be held by mail, with results to be revealed at the party.

The chairman also announced the appointment of an education committee to investigate ways and means of instituting an educational course in rubber technology in the area, under sponsorship of the Group. This committee consists of E. D. Covell, Stedfast Rubber Co.; Frank Gregory, Boston Woven Hose; George Hunt, Simplex Wire; A. I. Ross, American Biltrite Rubber Co.; and William Walker, Hood Rubber Co.

After-dinner speaker was Paul Swaffield, Hood Rubber, who was a registered football referee for more than 35 years. Speaking on "Football as a Referee Sees It," Mr. Swaffield gave an interesting account of his experiences.

[1] P. 637.
[2] P. 222.

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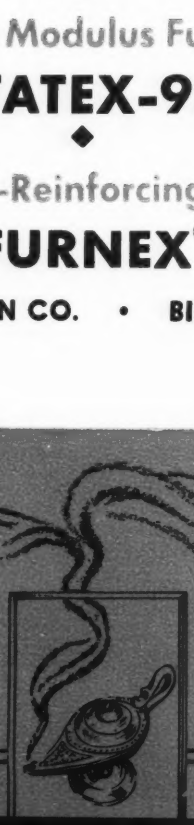


Jet Propulsion at Thiokol Meeting

AT A meeting on October 21 of the Thiokol Technical Club of the Thiokol Chemical Corp., Trenton, N. J., 190 members and guests heard an address by H. G. Jones, chief of the rocket and launcher section, research and development division, United States Army Ordnance Corps, on the subject of "Jet Propulsion."

The talk, preceded by a social hour and dinner at the company's recently enlarged headquarters, covered the principal characteristics of rockets, turbojets, ram jets, and pulse jets. Mr. Jones described the progress made by the aircraft industry from the 500 mph., 50,000-foot ceiling, reciprocating engines to the present 5,000 mph. rockets which have no finite altitude limitations. These accomplishments, however, have been made at the expense of vast increases in fuel consumption, with about 30 times more fuel required per pound of thrust for the rockets than for the reciprocating engines. The fuel used in the rockets differs from that used in the jets; the former consists of either a liquid oxidant or solid material composed of crystalline oxidants.

The speaker closed with remarks that use of jet and rocket units as sources of power for locomotives, boats, and in miscellaneous applications such as drilling oil wells is possible in the foreseeable future.

Chemical Marketing Lectures

THE New York Section of the American Chemical Society is sponsoring a weekly series of lectures on the "Marketing of Chemicals." Begun on October 14 and continuing through December 15, the meetings will feature addresses by experts in the various fields of marketing, with emphasis on the distribution of new products of research, and development of new markets for existing products through applied research and technical service. A special fee is charged for the series.

The lectures, which consist of addresses, questions, and discussions, are held from 7:00-9:00 p.m. in the Carbide & Carbon Corp. building at 30 E. 42nd St., New York 17, N. Y., according to the following schedule:

October 14: Welcome Address, E. S. Carmichael, Socony-Vacuum Laboratories; "Introduction—The Interest of All Chemists in Marketing," L. Flett, Allied Chemical & Dye Corp.; and "Principles of Marketing Chemicals," R. S. Alexander, Columbia University.

October 21: "The Marketing Phases of Research and Development," R. P. Dinsmore, Goodyear Tire & Rubber Co.; and "Application Research Case History—Antioxidants," J. E. Magoffin, Eastman Chemical Products, Inc.

October 28: "Chemical Market Research," E. K. Burger, Esso Standard Oil Co.; and "Use of the Chemical Literature in Marketing," J. W. Perry, Battelle Memorial Institute.

November 4: "Chemical Publicity," J. R. Callaham, *Chemical Engineering;* and "Chemical Advertising," H. B. Lowe, Reinhold Publishing Co.

November 12: "Sales Development—New Products," J. A. Field, Carbide & Carbon; and "Sales Development Case History—Synthetic Fibers," C. A. Setterstrom, Carbide & Carbon.

November 18: "New Markets for Old Products," K. H. Klipstein, American Cyanamid Co.; and "New Markets for Old Products Case History—Plastics & Resins," R. Williams, Jr., Roger Williams, Inc.

November 24: "Technical Service in the Petroleum Industry," T. G. Roehner, Socony-Vacuum Laboratories; and "Technical Service Case History—Non-Ferrous Metals," O. B. J. Fraser, International Nickel Co.

December 2: "Technical Sales," J. G. Park, Enjay Co., Inc.; and "Case History—Competitive Petrochemicals," A. A. Williams, Celanese Corp. of America.

December 9: "Role of the Distributor in Chemical Sales," L. Stievater, McKesson & Robbins, Inc.; and "Case History—Agricultural Chemicals," T. H. McCormack, E. I. du Pont de Nemours & Co., Inc.

December 15: "Economic Research in the Chemical Industry," M. W. Leland, Shell Chemical Corp.; and "Effect of Current Economic Situation on Markets," E. H. Schell, Massachusetts Institute of Technology.

Tlargi Group Meets

THE Los Angeles Rubber Group, Inc., held its first regular meeting of the season on October 6 at the Hotel Statler, Los Angeles, Calif. Some 125 members and guests attended the afternoon technical session which featured talks on the compounding and applications of butyl rubber, by R. M. Thomas, Standard Oil Development Co., and W. H. Peterson, Enjay Co.

Approximately 335 persons attended the evening dinner session, sponsored by Plastic & Rubber Products Co. The dinner was followed by an excellent entertainment program and the distribution of door prizes contributed by Plastic & Rubber. Prize winners were Leroy Tinkham and Thomas Keenan, Plastic & Rubber; Glen Bitkowski, Western Insulated Wire Co.; Gene Huxley, Pacific Moulded Products Co.; Bill Fairclough, Naugatuck Chemical Division, United States Rubber Co.; and Fred Cinder and Charles Brown, guests.

The Group announced that 44 men, a capacity registration, are taking the course in Basic Rubber Technology A this year. Sponsored by Tlargi at the University of Southern California, the course is being given by A. F. Reznicek, W. J. Voit Rubber Corp., with guest speakers from the local rubber industry.

Hot Oil Masterbatch Polymer

THE Office of Synthetic Rubber, Reconstruction Finance Corp., in a memorandum dated October 16, has announced that the number X-757 has been assigned to a hot oil masterbatch polymer of the following description: 25 parts aromatic oil plus 100 parts base polymer; 23.5% bound styrene; persulfate catalyzed; fatty acid soap emulsified; 122° F. reaction temperature; 68% conversion; hydroquinone short-stopped; staining stabilizer; salt-acid coagulated; and mean Mooney of masterbatch, 48 (ML-4 at 212° F.).

It is stated that the accepted interchangeable aromatic processing oils, Sundex 53 or Shell SPX 97, are to be used in the production of X-757 as is done in the production of cold oil masterbatch polymers. The processing oil used will be identified by its proper code on both the quality report and the container, in accordance with the standard practice of RFC.

N. Y. Section, A.I.Ch.E. Holds Annual Meeting

THE New York Section of the American Institute of Chemical Engineers held its annual meeting at the Hotel New Yorker, New York, N. Y., October 22. Approximately 350 persons attended the all-day conference, which consisted of three symposia on management, solids handling, and new materials of construction, with a cocktail hour and luncheon at noon.

The management session heard addresses on "Money for Chemical Growth," W. H. McElnea, Empire Trust Co.; "Improving the Company Organization," E. Dale, management consultant; "Management Controls for Positive Direction," A. Tichenor, Booz-Allen & Hamilton; "Maintenance," H. W. Shockley, E. I. du Pont de Nemours & Co., Inc.; "Materials Handling," A. K. Strong, American Cyanamid Co.; "Effective Utilization of Personnel," J. E. Binns, American Management Association.

Mr. McElnea, speaking on present methods of financing large-scale chemical expansion, stated that most companies prefer debt financing rather than issuance of common stock for the following reasons: the present tax laws, including both the excess profits tax and the capital-gains tax; deductible treatment of bond interest; certificates of necessity, which allow rapid amortization of the cost of new facilities; and the fact that a saving can be realized since interest on borrowed money is usually much lower than expected return on other capital, including that derived from the sale of stock. The anticipated repeal of EPT and the opinion of most companies that a business downturn is coming are expected to reduce the amount of debt financing.

Mr. Shockley covered maintenance in chemical plants, stating that costs of such services have increased over the last few years to 7-14% of operating expenditures. The ratio of maintenance personnel to operators has correspondingly decreased to from 1:1 to 1:3.

At the new materials symposium, the following topics were covered: "The Trend to Thick Protective Coatings for Chemical Exposures," R. R. Pierce, Pennsylvania Salt Mfg. Co.; and "New Developments in Plastics for Chemical Construction," G. S. Laaff, Bolta Co.

Mr. Laaff pointed out the value of unplasticized polyvinyl chloride, polyesters, and polyethylene in chemical construction applications.

At the solids handling session, the subject of "Conveying—A General Survey of Handling Bulk Solids" was covered by H. M. Weil, of Chain Belt Co., following which R. U. Jackson, of Hewitt-Robins, Inc., delivered an address on the "Economic Use of Heavy-Duty Belt Conveyors."

Rubber Quality Discussed

A TALK on "The Quality of Crude Rubber and the Outlook for Natural and Synthetic Rubber" by C. J. Zabik, General Tire & Rubber Co., featured the October 1 dinner-meeting of the Fort Wayne Rubber & Plastics Group. Eighty-six members and guests attended the meeting, first of the current season, which was held at the Hotel Van Orman, Fort Wayne, Ind. Announcement was made of the appointment of the following committee chairmen for the new year: member-

(Continued on page 241)

NEWS of the MONTH

Two members of the three-man Rubber Facilities Disposal Commission, Everett R. Cook and Leslie R. Rounds, were appointed October 6. The third member is expected to be announced during November. Mr. Cook, a cotton merchant, and Mr. Rounds, a banker, said they would make every effort to meet the deadline of January 31, 1955, for completing their job, but that they would need a lot of cooperation from everyone concerned. Advertising soliciting bids for the government owned synthetic rubber plants will probably begin in December.

The Reconstruction Finance Corp. instituted a new 90-day advance order sales policy for large consumers of dry GR-S, effective with orders which have been placed for delivery after October 31, 1953.

The RFC contract for its tire testing program has been awarded to Armstrong Tire & Rubber Co. The budget for this program has been reduced from almost $2 million to $450,000, and the RFC has liquidated its own tire testing facilities at Camp Bullis, Tex., following the recommendation of a House Armed Services subcommittee that the government could get the work done cheaper and more effectively by contracting it to private firms which maintain tire test fleets.

The legality of the quantity discount limit ruling on replacement tires of the Federal Trade Commission will be determined in Federal District Court as a result of the decision of Acting Solicitor General Robert L. Stern that he would not grant the request of the FTC to uphold the ruling of Federal District Judge McGuire that the tire industry's request for such a trial was premature.

Four rubber companies cited by the FTC for illegal price discrimination in the sale of heels, soles, and other shoe repair products have signed consent settlements in which they neither admitted nor denied having engaged in such practices, but have agreed to cease-and-desist orders prohibiting future price discriminations.

Industry executives have again expressed optimism for continued high-level business activity for the future.

Washington Report by Arthur J. Kraft

Two Synthetic Plant Disposal Commissioners Appointed; Ask for Cooperation in Meeting Deadline

President Eisenhower early in October named a Memphis, Tenn., cotton merchant and a New York banker to the Rubber Producing Facilities Disposal Commission, set up under law to develop a program for selling the government's synthetic rubber facilities to private industry.

Named to the Commission were Everett Richard Cook and Leslie Raymond Rounds.

A third Commissioner is yet to be named. One rumored candidate is Lyford Hutchins, of Winchester-Arms Co., subsidiary of Olin Industries. The President is expected to make known his choice for the third post within a few weeks of this writing. While it is by no means certain, the third man is expected to be tapped for chairmanship of the Commission. One usually well-informed source, however, reported that Mr. Cook is in line for the top post.

Commissioners Cook and Rounds were sworn into office, October 16, in a private ceremony in the office of RFC Administrator Kenton R. Cravens. They put in 10 hours that day reviewing the salient facts about the synthetic rubber facilities with members of RFC's staff. With this "quickie" educational course under their belts, the two Commissioners spent the following day—a Saturday—working up plans for hiring a staff and getting the disposal program under way. First order of business is putting out advertisements for bid proposals from industry for the plants. The Commissioners are shooting at a November 30 deadline for starting advertisements, but hope to beat that deadline, handily.

The Commissioners put in a call to the Justice Department, requesting the "earliest possible meeting" with Attorney General Herbert Brownell and his aides to discuss the placing of the advertisements and other matters relating to disposal. The Attorney General's approval is required before the ads can be placed, the Commissioners said.

Interviewed in the spacious, but sparsely furnished offices set aside for the Commission at the RFC office building, the Commissioners had this to say:

On meeting the deadline of January 31, 1955, for completing the job: "We hope to make it. We'll make every effort, but we'll need a lot of cooperation from everyone. Both of us realize the importance of moving ahead. Time factors enter in all along the line. We have a deadline to meet."

On staffing the Commission: The immediate aim is to get together the "nucleus of a staff." The Commission intends to operate "with as small a staff as possible." Needed first is a general counsel, since most of the initial work involves legal decisions which must be worked out with the Justice Department. This post was offered to Morton Yohalem, rubber disposal consultant to RFC, but he turned it down. Mr. Yohalem, however, will help the Commission while it looks for a general counsel. He then plans to sever his connection with the rubber disposal program. Expected to represent the Justice Department in its day-to-day dealings with the Commission are Attorney Ephraim Jacobs and Economist I. Lewis Marcus.

On helping prospective bidders put in their bids: The Commission will follow a "policy of encouraging all the bids we can." But that doesn't mean trying to drum up bids by actively urging anyone to enter a bid. "We will give prospective bidders a good deal of information on the plants; so they can prepare bids. We want to make it as easy as we can to enter bids."

At the moment RFC is completing comprehensive fact books on each of the plants from data available in its operation records, much of it heretofore unpublished. These books are expected to be distributed as brochures to prospective bidders. Large and small companies interested in bidding for the facilities will be treated alike, the Commissioners promised, in regard to the dissemination of information.

The Commissioners had not yet considered whether to make public or keep secret the findings of the Parsons report, the private engineering survey, made for RFC a year ago, setting forth the current replacement value, less obsolescence and deterioration, for each plant. The expectation is that this report will be kept secret at least until all bids are in.

As for the prospects of meeting the objectives of the disposal program, the Commissioners said, "We hope to get bids for the full value of the plants and negotiate ultimately to get a fair price."

The Commissioners do not believe the objective of a high return will prove inconsistent with another major objective, broad diversification of plant ownership so as to create a free, competitive synthetic rubber industry.

"We think the large oil, rubber, and chemical companies will cooperate with us, and we expect also to get bids from some others," the Commissioners declared.

The Commissioners view their negotiating task as permitting a great deal of flexibility. If a company enters a bid for any one copolymer plant, the Commission is prepared to negotiate with that company for the sale of any of the copolymer plants. The same goes for companies entering bids for butadiene plants. A bid entered on one or more plants within the major classifications of plants makes that bidder eligible for negotiating for the purchase of any of the plants in the same classification. The copolymer plants are one such classification; the butadiene plants another, and the butyl plants yet another.

The period in which the advertisements soliciting bid entries is to run will be part of the minimum six-month period required by the law for acceptance of bid proposals. This six-month period will be followed by at least seven months devoted to negotiating contracts. The Commission is required to submit a report to Congress on January 31, 1955, setting forth the contracts it has negotiated, its recommendations on whether these contracts should be permitted to take effect, and the findings of the Attorney General as to whether the proposed sales violate the anti-trust laws. Congress has reserved to itself the right to veto any or all of the proposed sales and has given all prospective purchasers the right to withdraw if Congress should exercise its veto power.

The Commissioners do not expect to give full time to the job during the entire run of the disposal program. Neither Mr. Cook nor Mr. Rounds intends to take up residence in Washington. They have jobs

at home to attend to and will come to Washington only when their presence is required. For the most part the actual negotiating will be conducted by the Commission staff, with the Commissioners themselves making the important decisions.

The Commissioners plan on assigning a member of the staff to handle publicity functions, acting as spokesman for the Commission in relations with the press. Press releases, however, will be few, since the Commission will not be operating in the proverbial goldfish bowl. Queries based on rumor will be largely ignored, particularly if they appear motivated by a desire to draw from the Commission information that it does not feel it should give out.

"We will pay no attention to such rumors," the Commissioners stated.

Here's a rundown on the salient biographical facts on the two Commissioners, as released by the White House:

Mr. Cook, age 59, is president of Cook & Co., cotton merchant and exporter of Memphis, Tenn., a firm which maintains offices in seven cities. He is a partner in Cook & Cia., of Sao Paulo, Brazil, an affiliate. Born in Indianapolis, Ind., educated in Memphis public schools, he entered cotton business in 1916. He served as a member of a United States mission to negotiate Peruvian cotton purchases in 1942 and later that year became U. S. Air Force colonel, serving in the United Kingdom, North Africa, and Italy. He became a brigadier-general in 1944 and has held a reserve commission at that rank since 1948. His war decorations include Distinguished Service Cross, Legion of Merit, Silver Star, and French Croix de Guerre palm. A special assistant to the War Food Administrator near the close of war, Mr. Cook also served in 1945 and 1946 as economic adviser to the State Department. In 1950 he was named member of the Defense Department's Civilian Components Policy Board. Currently he is president of the American Cotton Shippers Association and a member of the New York, New Orleans, and Memphis cotton exchanges. He is married and has a son and a daughter.

Mr. Rounds, age 67, first vice president of Federal Reserve Bank of New York (Fed. Res. District 2) with offices at 33 Liberty St., was born in Kennebunkport, Me., and still is a legal resident of that town, where he was educated in the public schools. He joined Portland & Rumford Falls Railway as an accountant in 1903, and later became associated with Rumford Falls Lumber Co., Rumford Falls, Me. He served as office manager of Hiram Ricker & Sons in New York and Portland, Me., from 1909 to 1916. Mr. Rounds joined the Federal Reserve Bank of New York in 1917 and became a vice president in 1933 and first vice president in 1940. He is a trustee of Skidmore College and also is a prominent national fund raiser for Congregationalist Church projects.

RFC Institutes 90-Day Forward Ordering of GR-S

RFC Administrator Cravens last month instituted a new sales policy for dry GR-S synthetic rubber "to help the Corporation (RFC) anticipate consumer demands, schedule production more evenly, and avoid unwarranted high inventories." As reported in previous issues of India RUBBER WORLD, the new sales policy, under consideration for several months, reflects a general tightening up at RFC to put the rubber program on a more economical basis.

Other recent actions which are evidence of the drive toward economy were last summer's price increase for butyl rubber and the 85,000-ton inventory limitation for GR-S imposed on RFC by the Budget Bureau. Mr. Cravens had consistently opposed suggestions by the rubber industry that RFC carry a heavier inventory. Last August he ordered a sharp cutback in GR-S output through the remainder of the calendar year in order to trim down current RFC inventories. The new sales policy, requiring binding, long-term orders from the larger consumers of dry GR-S, was imposed over the objections of the consuming industry.

The new sales policy was announced on September 30 and became effective with orders placed for delivery after October 31. Keynote of the new policy is that large consumers are required to place their orders covering a 90-day forward period, rather than the month-to-month basis previously required. With the bulk of future deliveries fixed by long-term purchase commitments, RFC expects to be able to control its production to keep supply in line with demand.

The need of better control is particularly urgent now, with government inventories of GR-S at about 80,000 tons, or only 5,000 tons shy of the maximum RFC is permitted to have on hand next June 30. Government stocks mounted by 10,000 tons during August, when Mr. Cravens issued the order to trim back production sharply in order to roll back inventories to about 65,000 tons on December 1. It now appears that it will take somewhat longer to roll back to this figure. The production cutbacks ordered in August were aimed at holding inventory accretion during September to 6,000 tons and reversing the tide starting in October. Production for the October through December quarter was scheduled at 122,500 tons, as against an estimate, by the RFC rubber industry advisory committee last summer, that demand would total 136,000 tons. This would allow an inventory reduction of about 13,500 tons to a level of about 67,500 tons on December 31. October purchases of GR-S, however, amounted to only 43,000 tons, and November orders were 41,000 tons, a total of 84,000 tons, with 52,000 to go in order to reach the predicted 136,000 ton level. Early estimates indicate a demand for only 38,000 tons of GR-S during December, bringing total demand for the last three months of the year to 122,000 tons. The low December figure is a tentative RFC estimate based on orders placed by the consuming industry under the new sales policy which became effective with November deliveries.

Past errors in forecasting, a difficult business at best, have brought trouble, though the difficulties were not regarded as critical at the time. In the past RFC relied chiefly on quarterly demand forecasts by its rubber industry advisory committee for planning production. These forward estimates were not always backed by purchasing commitments. Actual demand, as it unfolded subsequently, sometimes exceeded and sometimes fell short of predictions. The sustained, upward march in demand for GR-S which began in late 1952 was not expected and came hard on the heels of RFC directives to place the alcohol butadiene plants and part of the Institute, W. Va., copolymer plant in "standby" status. The Institute shutdown order was suspended, and the mothballing of the alcohol plants was nearing completion when the sudden surge in demand forced abrupt reversal of the directives. The shutting down and reactivation operations cost nearly $1 million to carry out. It took several months to get the alcohol plants back into full swing, during which government inventories dropped precipitously to barely a working minimum, and a mild form of rationing was required as anxious consumers boosted their orders. When GR-S production hit full stride in the spring and early summer, as new records were set, demand went into a decline. The result has been a sharp rise in government inventories which, it is expected, will be arrested in October as a result of the August decision to trim fourth-quarter output to a figure below that of anticipated demand.

Under the new sales policy, large consumers (defined as purchasers of 750,000 pounds or more of GR-S in any one of the months of June, July, or August, 1953) were required to place firm orders by October 10 for November delivery requirements. Orders for December and January delivery had to be filed by October 15. Orders for shipment during any month after next January must be submitted by the fifteenth day of the third month prior to that month in which shipments are requested (November 15 for February delivery, December 15 for March delivery, and so forth). These orders will be firm and binding on both the purchaser and on RFC. Upon issuance of shipping orders by RFC, orders submitted after the dealine, provided they are accepted, will be filled at a penalty of ¼¢ a pound.

More than 700 small consumers, comprising the vast majority of RFC customers, have been exempted from the 90-day forward buying commitment. They will be required to submit firm purchase orders on only a 30-day forward basis, placing these orders by the tenth day of the month prior to delivery. Purchase orders filed by smaller consumers after this deadline will also carry a ¼¢ a pound penalty. All purchasers, large or small, will have price protection during the term of their agreement with RFC and will be granted the benefit of any price reduction put into effect before shipment. The term of the agreement, for orders placed by deadline, is 105 days in the case of large purchasers and 45 days in the case of small purchasers. In the case of orders placed after deadline, price protection will apply from the date the order is placed to the time of shipment.

All purchasers are required by the tenth day of the month prior to the month during which shipment has been requested to give RFC written notice of the particular types of GR-S they want delivered. Otherwise RFC reserves the right to ship (to any plant or office of the purchaser, by any route or mode of transportation) any type regularly purchased by the purchaser within the classifications specified in the forward orders. In placing forward orders purchasers may confine their orders to one or more of the following classifications: hot non-pigmented GR-S, hot pigmented GR-S, cold non-pigmented GR-S, cold pigmented GR-S, cold oil masterbatch GR-S, and cold oil-black masterbatch GR-S.

Exempted from the new sales policy are GR-I (butyl), GR-S latex, and certain dry GR-S polymers of small production. The procedure and basis for sales of these were unchanged. The list of dry GR-S polymers excepted from the new policy follows: GR-S 1014, 1015, 1016, 1017, 1018, 1019, 1020, 1021, 1022, 1023, 1102, and 1503 and all X-numbered polymers.

RFC reported September sales of GR-S amounted to 42,863 tons. Production was estimated at about 40,750 tons in October and 42,650 tons in November. A detailed breakdown of the September and October figures follows: September sales (actual):

total GR-S, 42,863 long tons; LTP GR-S, 25,617; black masterbatch, 6,552; oil masterbatch, 9,098; oil-black masterbatch, 1,859; GR-S latex, 3,386; and butyl rubber, 5,144 tons. October scheduled production (estimated): total GR-S, 40,750; LTP GR-S, 28,000; black masterbatch, 6,400; oil masterbatch, 11,700; oil-black masterbatch, 3,125; latex, 3,200; and butyl rubber, 6,700 tons.

RFC Tire Testing Contract to Armstrong

A contract to conduct a tire testing program for RFC has been awarded to Armstrong Tire & Rubber Co. following the dissolution of RFC's own tire testing program this past summer.

The RFC program had been conducted at Camp Bullis, near San Antonio, Tex., with Copolymer Corp. handling the tire testing work under RFC supervision. In the past fiscal year $1,975,000 was spent on the program, including $425,000 made available by the Army Ordnance Corps for special military tire testing.

RFC on September 30 announced the sale of the tire testing equipment it had at Camp Bullis, following liquidation of that program. Awards to a number of bidders brought in $96,800 for the equipment, which included such items as passenger cars and trucks, vehicle parts, tires, test weights, and tachographs. The program at Camp Bullis had come under sharp attack this spring from a House Armed Services subcommittee, which charged that the government could get the work done cheaper and as effectively by contracting it out to private firms which maintain tire test fleets.

This advice was followed, when Armstrong, which maintains its tire test fleet at San Antonio, submitted the lowest bid of the seven firms which entered bids to RFC. All bids were on a per vehicle mileage basis. RFC sought bids from the 11 firms operating tire testing facilities. The seven which submitted bids, besides Armstrong, were U. S. Rubber, Firestone, General Tire, Goodrich, Goodyear, and Gates. Four others—Southwest Research Institute, Copolymer, Lee, and Seiberling—declined to bid for the contract.

RFC has budgeted $450,000 for tire testing during the current fiscal year, which ends next June 30. No military testing is provided for, since Ordnance, at the urging of the House Armed Services committee, terminated its participation in the program. Even so, the amount to be spent by RFC on tire testing this year is only about 30% of the amount budgeted by RFC last year.

RFC officials said Armstrong will conduct the same kinds of tests, over the same types of terrain, as were carried on in the past at Camp Bullis. A chief objective of the tire testing program continues to be the development of a 100% synthetic rubber truck and bus tire. Because of the heat build-up factor, large tires, such as those used on trucks and buses, are presently required to contain fairly substantial amounts of natural rubber.

RFC declined to disclose how much Armstrong or any of the six other bidders had bid for the contract, which runs until next June 30. The government is expected to seek new bids from private firms for next year's program, if it continues the program beyond this year. The $450,000 budgeted for the current fiscal year includes some funds spent while the program was still at Camp Bullis. The remainder, and by far the larger portion, will cover the work done by Armstrong for the balance of the fiscal year.

FTC Quantity Discount Rule on Tires to Come to Trial

The Federal Trade Commission's controversial Quantity Discount Limit Ruling on automobile replacement tires and tubes will come to trial in Federal District Court after all. This point was assured during October, when the Department of Justice, chief legal agency for the government, put an end to preliminary skirmishing aimed at fending off lawsuits challenging the validity of the FTC ruling.

The quantity limit ruling was promulgated by FTC in January, 1952, and scheduled to go into effect on April 7. But a bevy of lawsuits was filed in Federal District Court challenging the constitutionality of the ruling and seeking both temporary and permanent injunctions against it. A series of court-ordered stays has kept the ruling from going into effect, as preliminary moves occupied the courts.

The first of these moves was taken by FTC and the Justice Department, when they sought to have the lawsuits dismissed on grounds that the suits were brought prematurely. The government's contention was that the plaintiffs (the tire manufacturing industry and some others) could not challenge the ruling before it took effect; in other words, they would have to sustain some injury from the ruling before they could challenge its validity. The government won this round in December, 1952, when Federal District Judge Matthew McGuire dismissed the tire industry suits.

The companies appealed to the U. S. Court of Appeals and won a reversal of Judge McGuire's decision. The Appellate Court remanded the case to District Court and ordered that it be tried on its merits. FTC thereupon recommended that the Justice Department ask the Supreme Court to reverse the Court of Appeals (and uphold Judge McGuire). Speaking for the Justice Department, Acting Solicitor General Robert L. Stern announced in October that he would not grant the FTC's request. His decision not to apply for a Supreme Court review means that the case now goes back to the District Court for determination of the validity of the quantity limit ruling. At the moment there has been no indication from the District Court as to when it would schedule a start on the trial.

Being contested is a ruling which prohibits tire manufacturers from granting discounts by reason of the quantity ordered which are greater than the quantity discount customarily offered on a single shipment of one 20,000-pound carload of replacement tires and tubes. FTC issued that ruling after public hearings showed, to the FTC's satisfaction, that the substantial discounts granted by tire manufacturers to purchasers of large quantities of tires had injured the competitive position of small, independent tire dealers.

If the FTC ruling ultimately is sustained by the courts, the maximum discount which may be granted by reason of quantity will be that offered by manufacturers on a single shipment of one 20,000-pound carload. This is a relatively small discount when ranged against the substantial discounts granted to large-scale buyers, according to data presented in the FTC's hearings in 1951.

The quantity limit ruling was issued by FTC under the so-called "quantity limit proviso" put in the Robinson-Patman Act, 17 years ago, but never utilized until last year when it was applied by FTC to the tire industry. The ruling was imposed by a divided FTC, with the four Democrats then serving voting for it and the one Republican, Lowell Mason, dissenting. Since then, the complexion of the FTC has changed markedly; the present FTC has three Republicans and two Democrats.

Rubber Study Group Meeting on Buffer Stock Plan

The International Rubber Conference opened in London, England, October 12, as delegates of 18 rubber consuming or producing nations, meeting as the Management Committee of the International Rubber Study Group, considered a suggested buffer stock scheme to siphon off the market-surplus natural rubber.

The conference, expected to run about two to three weeks, was convened to review the facts of the current rubber situation, secure accord on the outstanding points in the draft rubber stock scheme, and examine whether any agreed view between member country delegations appears possible on the necessity of such a scheme.

Even if the conference should iron out all the technical problems to developing a workable buffer stock scheme and also agree to its necessity, it lacks authority to put the scheme into operation. The best it can do is to go back to member governments with a recommendation that these governments request the United Nations to call a commodity conference. A UN commodity conference could approve the scheme, which would then require confirmation by individual governments (the U. S. Senate in the case of this country) before it could go into effect.

Delegates attended the London conference from Australia, Belgium, British Colonial and Dependent Territories, Cambodia, Canada, Ceylon, Denmark, Western Germany, France, Indonesia, Italy, Japan, Liberia, the Netherlands, Thailand, the United Kingdom, the United States, and Vietnam. Representing the U. S. were Willis Armstrong, delegate, and George Alexander, alternate delegate, both of the State Department. With them as advisers were A. L. Viles, president, The Rubber Manufacturers Association, Inc., and R. D. Young, vice president, Rubber Trade Association of New York. This country's position, discussed at a late September meeting of the delegates with the State Department rubber industry advisory committee, is opposed to a buffer stock scheme, but not to discussion of it.

Meanwhile W. O'Neil, president, The General Tire & Rubber Co., issued a statement in mid-October objecting to the natural rubber growers' attempt to get the RFC to raise the price of GR-S in order to encourage higher prices for natural rubber, then selling for 20¢ a pound.

O'Neil said such a step should not even be considered since the government was already making from 15 to 16% on its synthetic rubber production. He pointed out that the government made $60 million during the 1953 fiscal year and expected to make $75 million for fiscal 1954 and that to raise the price of synthetic rubber would reduce demand and run the risk of changing a profitable operation into a loss.

With reference to the "buffer stock" scheme, O'Neil called this another unsound proposition that no American businessman would accept.

BDSA Replaces NPA in Commerce Department

The National Production Authority, born with the outbreak of war in Korea, became a memory on October 1 when it was replaced by the Business & Defense Services Administration. Like NPA, the new agency is part of the Department of Commerce. BDSA continues the residual defense and mobilization functions of the former NPA, consolidates five Commerce Department offices, and establishes 25 industry divisions, staffed by business experts from government and private industry. Commerce Secretary Sinclair Weeks said the new agency will provide a "focal point for effective cooperation between government and business in promoting economic stability and growth."

The Department's plans for effectuating that "effective cooperation" include the establishment of a "broader and more representative" industry advisory system than the NPA industry advisory committee set-up. Keystone of this plan is industry advisory councils, made up of top-level company executives, each council having authority to draw up its own agenda, select an industry man as chairman, and maintain its own staff. As mentioned last month, it looks like Mr. Weeks has run into a roadblock in getting this industry council plan into operation. The Justice Department has raised stiff objections to advisory committees operating without government chairman and government-fixed agenda. It regards these as necessary safeguards to prevent the councils from engaging in activity which might violate the anti-trust laws. The council plan reportedly was the "baby" of former Commerce Undersecretary Craig Sheaffer, and Mr. Sheaffer's resignation is said to have been prompted as much by his inability to get this plan approved by the Justice Department as by his role in the battery additive dispute with Commerce's Bureau of Standards Chief Allen Astin.

Charles F. Honeywell was named Administrator of BDSA, and Horace B. McCoy, veteran Commerce Department official, is Deputy Administrator. The 25 industry divisions, which they will administer, each will be headed by men drawn from the ranks of industry, serving without government compensation for six-month terms. In contrast to the rotation scheme for industry division directors, each industry division will also have as deputy director a career government official serving on a permanent basis.

Operating under Mr. Honeywell and Mr. McCoy will be three assistant administrators, each taking responsibility for several of the 25 industry divisions.

In addition to the industry divisions there are the Office of Field Services and three staff offices. The Office of Field Services will carry out field programs of BDSA and the Bureau of Foreign Commerce and deal with business activity at a local level. The staff offices include: one called the Office of Technical Service, which is a clearing house for government technical information of interest to industry; another called the Office of Small Business, to act as liaison between the Department of Commerce and the Small Business Administration; and the third, the Office of Distribution, which will be concerned with marketing and distribution programs and policies for the retail, wholesale services, and distributive trades.

The Chemical & Rubber Division is headed by Norman E. Hathaway, Davison Chemical Co., with L. B. Kilgore, a career government employe as deputy director, both of whom held similar positions with the NPA Chemical & Rubber Division since August 31. Everett G. Holt, another government career man well known in the rubber industry, is assistant director for rubber. The Rubber Branch is headed by S. E. Overly; the Organics & Drug Branch by Leonard Weirich; the Inorganic & Agricultural Chemicals Branch by W. R. Koster; the Program & Requirements Branch by F. M. Hoffheins; and the Plastics & Protective Coatings Branch by R. G. Ehlers.

Heel and Sole Companies Sign Consent Settlements

The four rubber companies, cited by FTC more than a year ago for illegal price discrimination in the sale of rubber heels, soles, and other shoe repair products, have signed separate consent settlements with the Commission in which they have agreed not to discriminate in price.

Such settlements were signed by American Biltrite Rubber Co., The B. F. Goodrich Co., Goodyear Tire & Rubber Co., and O'Sullivan Rubber Corp. In signing the settlements the respondents neither admitted nor denied having engaged in the practices which the Commission had charged violated the Robinson-Patman Act. They agreed, however, not to engage in them by consenting to the cease-and-desist orders prohibiting price discrimination, direct or indirect, between different purchasers.

The complaints filed by the Commission on September 22, 1952, charged that the alleged price discriminations were effected through cumulative volume discount plans. Under these plans, the complaints charged, discounts, rebates, or allowances were granted by the four firms from net selling prices. The alleged discounts were based on a customer's total purchases of shoe repair products during the year. The Commission said the net effect of these volume discount plans is to reduce substantially the prices charged favored customers as compared with other customers. FTC further charged that these reductions may substantially lessen competition or tend to create a monopoly in the lines of commerce in which the respondents and their customers are respectively engaged.

The consent settlements were accepted by the Commission with Commission Chairman Edward F. Howrey not participating and Commissioner Lowell B. Mason dissenting. Mason was outvoted by Commissioners James M. Mead, Albert A. Carretta, and Stephen J. Spingarn, all Democrats. Since the acceptance of the consent decree, Mr. Spingarn has been replaced on the Commission with a Republican, former Congressman John W. Gwynne. This appointment gives the Commission a Republican majority.

Business Census May Be Revived

The Census of Business & Manufactures, killed for this year by an economy-minded Congress, may be revived next year. Under the law the Census, taken at five-year intervals, was due to be taken this year. Over the vigorous objections of leading businessmen, however, Congress denied the $11.5 million sought to conduct the job. Hopes for its revival next year hinge on indications that business leaders will apply pressure on Congress to make the money available.

Business firms have come to rely on the Census as a storehouse of data on which to base sales plans and other programs, where to put up new factories and expand markets. The Commerce Department, which was stunned by the refusal of funds, cannot do very much, outside of expressing informal opinion, to get the funds restored, since government agencies are prohibited by law to lobby for appropriations. However the Department's top echelon Business Advisory Council, a cross-section of America's industrial leadership, can be expected to take a hand along with other business groups in pressuring Congress to reverse its "economy" move.

Other National News

Goodyear Executives Optimistic

The two top executives of Goodyear Tire & Rubber Co., in public statements during October, were optimistic about the future outlook for the rubber industry. P. W. Litchfield, chairman of the board, and E. J. Thomas, president, told Goodyear representatives at the Homecoming celebration in Akron, marking the company's fifty-fifth anniversary, that they should have no fear of the future.

Thomas declared that every study Goodyear had made of the future indicates a growth in car, truck, and tractor registration, with greater consumption of rubber and a wider use of all rubber products, although the period immediately ahead may be one of lesser opportunity for production in some lines.

"Our great concern is the continued wage rise with its effect on costs, and the lag in productivity without very heavy capital expenditures coming from lesser amounts of earnings available after the call of the heavy handed tax collector," he said. "All of us, including the government, are finding more today the necessity of facing some of the facts of life and business that have become obscured, and I think we are all going to be the better for it," he added.

In a talk before the National Association of Independent Tire Dealers convention in Cincinnati, O., October 12-14, Thomas predicted that world rubber consumption would hit a record-breaking high of 2,400,000 long tons this year. He pointed out that the United States is using up rubber at the annual rate of 1,336,000 tons; while the rest of the world will consume the balance to reach the all-time industry high.

Sales opportunity in the retail tire field will be larger next year and increasingly larger in the years ahead, but Thomas stressed the need of tire dealers to hire and train competent personnel to serve the customer better since we have passed from a seller's to a buyer's market.

Outlook for '54 Called Good

In contrast to fears of an early recession or depression forecast in some circles, J. W. Keener, Goodrich vice president, predicted that the United States will enjoy one of the most prosperous years in its history, in a recent talk before the Institute of Industrial Relations and the Schools of Business Administration and the University Extension of the University of California.

Keener said that in terms of generally accepted economic measurements, 1954 will rank with the second and third best years in the nation's history, although averaging from 6% to 10% below 1953. The possible economic consequences of reduced government spending through 1954 is not a factor of importance to general business levels.

Discussing possible over-expansion of business, with consequent over-production and unemployment, Keener said it is extremely unlikely, in the absence of a monetary collapse, that the nation could have a general condition of over-expansion. He indicated that the real concern could stem from not having sufficient production facilities to supply the increasing population.

Keener viewed the 1954 expansion plans of business and industry as approaching the record levels of 25 to 27 billions of dollars expended in 1951-52-53. The need of private investment in plants and equipment is increasing rather than lessening.

Concerning fears about the size of current inventories, Keener believes that reduction of inventories to adjust high production levels to current high sales levels—instead of continuing production at levels above present sales requirements—will have no effect on total sales and only minor effects on total production and employment. He said that the price level of the last six months has been almost stationary and foresees relatively stable prices in the year ahead.

The consumer credit level appears to hold no danger to 1954 business prospects, he added. The current and accumulated spending power of consumers as a whole is far more than is necessary to offset any possible slowing that may result from stabilized or curtailed consumer credit expansion.

Tire Prices Raised

Tire manufacturing companies raised the prices of tires from 2½ to 5% in October. The move was initiated by United States Rubber Co. on October 1, when it announced that all passenger-car tire prices were being raised 2½% and passenger-car inner tubes 3½%. All types of truck tires and tubes were increased 5%; while industrial pneumatic tires and tubes and farm tires were upped 2½%.

The increased costs of providing improved tire constructions and the greater cost of labor, materials, and transportation were given as the reasons for the price increases.

Similar tire price increases were announced by General Tire, Seiberling, Goodyear, Goodrich, Mohawk, and Firestone during the early part of October. It is expected that all the remaining tire companies will make price increases, if they have not done so already.

The tire price increase is the first by any rubber company since 1950. Meanwhile the companies have absorbed two previous wage increases and a higher price for synthetic rubber and other raw materials. Price increases on tires at this time of the year are unusual since the heavy buying season has passed, but the industry has taken the position that recent cost increases far outweigh the fact that the time is wrong for price increases. Total sales of tires in 1953 will be close to 100 million, an increase of more than 10% over the 1952 figure.

S. W. McCune, III — E. Paul Hartsfield — M. A. Smook — F. Herman Fritz, Jr.

U. S. Rubber and Others Also Sign New Labor Contracts

In addition to the new contracts between Goodyear, Firestone, and Goodrich and the United Rubber Workers of America, CIO, announced in our October issue, U. S. Rubber signed a new contract with the URWA on September 28. This U. S. Rubber settlement included a wage increase of 5¢ an hour, but a proposed accident and health insurance policy, if accepted by the various local unions and their members, would have the cost of its premiums deducted from the 5¢-an-hour increase. Life insurance coverage of $3,000 for each worker, which is an improvement over the previous arrangement, was included in the new contract. Also, monthly pensions for workers with 25 years service at 65 years of age are increased from $100 to $125 (including Social Security benefits).

Seiberling Rubber Co. and the URWA on September 25 signed an essentially similar contract to those of the Big Four companies. Earlier in the month the same-type contract had been signed by General Tire and the URWA.

Western Plant Maintenance Show

Plans for the first Plant Maintenance Show to be held in Los Angeles, Calif., on July 13-15, 1954, were revealed recently by Clapp & Poliak, Inc., national exposition management firm, and a sponsoring board of leading western industrialists. Scheduled for the Pan Pacific Auditorium, the Show will be held concurrently with a Plant Maintenance Conference, which will be directed by L. C. Morrow, consulting editor of *Factory Management & Maintenance*.

Curtis K. Campbell has been appointed field merchandiser serving the southern zone of the associated tires and accessories division of The B. F. Goodrich Co., Akron, O. While a new member of the division, Campbell is, however, not actually a newcomer to the tire sales and merchandising field. Prior to joining the division, he had been associated with a prominent chain-store organization.

Transfers "Hypalon" Staff

Responsibility for further commercial development of "Hypalon" chlorosulfonated polyethylene has been assigned to the rubber chemicals division of the organic chemicals department, it was announced October 22 by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. "Hypalon," a new synthetic elastomer, was originated and introduced by the polychemicals department. The company's aim in shifting future responsibility is to serve the rubber industry better by utilizing the rubber chemicals division's long experience with neoprene and related products.

All sales and research work will be taken over by that division immediately. Production of "Hypalon" will continue in the present pilot-plant facilities.

Anticipating widespread application of the new elastomer's unique properties, the rubber chemicals division has established a new technical service group to assist customers in compounding "Hypalon." The new unit will be at the division's rubber laboratory in Deepwater Point, N. J.

November 1 was the transfer date, at which time a number of personnel changes also went into effect.

S. W. McCune, III, sales supervisor in the New York district, moved to Wilmington as assistant sales development manager, reporting to V. A. Cosler, and will have complete charge of "Hypalon" sales.

Malcolm A. Smook, from the polychemicals department, who has figured prominently in the development of "Hypalon" at the Du Pont Experimental Station, heads up the new compounding and research group at the Deepwater Point rubber laboratory.

Ward J. Remington, senior research chemist, and Ralph H. Sudekum, chemical and applications engineer, also from polychemicals, will join Dr. Smook's new "Hypalon" team at the rubber laboratory.

Two promotions in the neoprene sales group were next announced by the rubber chemicals division.

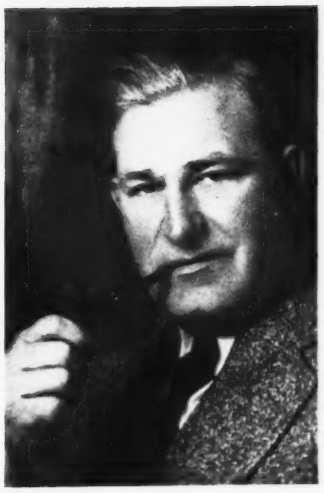
E. Paul Hartsfield, technical sales representative in the Akron area, has been appointed sales supervisor of the New York district to replace Mr. McCune.

F. Herman Fritz, Jr., supervisor of field service work at the division's Akron rubber laboratory, succeeds Mr. Hartsfield as sales representative.

Arthur D. Little, Inc., Cambridge, Mass., has moved its Midwest office from St. Louis, Mo., to Board of Trade Bldg., Room 3832, Chicago 4, Ill. John R. Kirkpatrick continues in charge of the office, which will conduct studies in the Midwest and facilitate relations with the firm's clients in that area.

Bianr & Stoller

John P. Coe



John E. Caskey

Coe and Caskey in New Posts

H. E. Humphreys, Jr., president, United States Rubber Co., Rockefeller Center, New York 20, N. Y., on October 6 announced the appointment of Vice President John P. Coe to handle the company's interests in the transfer of synthetic rubber plants from the government. Mr. Coe has been detached from his duties as general manager of the company's Naugatuck Chemical Division to devote full time to his new assignment. His major duty will be to work with the synthetic rubber plant disposal commission to be appointed by President Eisenhower.

As head of the company's rapidly growing chemical division, Mr. Coe supervised the design and construction of two of the 15 government GR-S synthetic rubber plants and managed the operation of five of them.

John E. Caskey last month was elected a vice president of U. S. Rubber and general manager of Naugatuck Chemical to succeed Vice President Coe.

Mr. Caskey then announced that George R. Vila, general sales manager of Naugatuck Chemical, will become assistant general manager of the division.

Mr. Caskey, together with Mr. Vila, will direct all sales, research, and production activities of Naugatuck Chemical, which has chemical plants in Naugatuck, Conn., Los Angeles, Calif., Painesville, O., and Baton Rouge, La.; operates two synthetic rubber plants for the government in Naugatuck and Port Neches, Tex., and the Kankakee Unit of Joliet Arsenal, Joliet, Ill., manufacturing high explosives for the Armed Forces.

Expanding Southern Operations

U. S. Rubber is expanding its Burlington, N. C., plant, which covers Lastex yarn with cotton, nylon, and rayon for use in anklets and short socks for men, women, and children. The expansion is expected to increase output of the plant almost 50%, according to Harry E. Cooper, sales manager of Lastex yarn and rubber thread.

Mr. Cooper also stated that more than 60% of the present output of the Burlington plant is shipped to manufacturers of anklets and short socks in North Carolina, and almost 90% is shipped to southern manufacturers.

Construction of a modern, two-story addition to the present building will be finished next month. U. S. Rubber will then move specially designed covering machines and electrical equipment from its Providence, R. I., plant. Other new equipment is being purchased for installation in the two-story addition.

To take care of the increased output, about 50 additional operators will probably be hired at the plant in 1954.

Superintendent of the Burlington Lastex plant is John C. Markham, Jr. Southern sales agent is Barnhardt Brothers, Charlotte, N. C.

The rubber company plans to open a new distributing branch office and warehouse for its U. S. Royal tires at 909 Haines St., Jacksonville, Fla., shortly after the first of the year, according to H. C. McDermott, district sales manager, and J. J. Kline, operating manager. The new one-story brick building, now under construction, will have an area of 40,000 square feet, of which 5,000 square feet will be air-conditioned office space. It will serve the entire state of Florida and parts of southern Georgia. The present branch at 104 Jefferson St. was opened in 1946. Growing volume of business is a principal reason why the company is moving to new quarters. Total building space will be just about double that of the existing facilities.

Other Personnel Changes

Lawrence H. Bruce, technical representative for the latex and aqueous dispersions group of Naugatuck Chemical, has been assigned to Akron, O. Mr. Bruce, formerly assistant technical sales representative in the New York and New Jersey area, has been associated with Naugatuck Chemical for approximately 11 years. Previous posts he has held include senior chemical engineer, foreman of Lotol plant, head of process engineering, chemist in latex laboratories, and assistant to the sales manager. In his new assignment he will make his headquarters at 247 E. Exchange St., Akron. His territory will include Ohio, western Pennsylvania, part of Indiana, West Virginia, and the eastern part of Kentucky.

Kent A. Blakeslee has been named assistant to Warren A. Tipton, general sales manager, mechanical goods division. Mr. Blakeslee, formerly a divisional production planning coordinator, makes his headquarters in the company's general offices in Rockefeller Center. He joined U. S. Rubber in 1950 as a sales training assistant in the mechanical goods division. Formerly he had been with S.O.S. Co., Chicago, as an administrative assistant, after having served as personnel director for Central Republic Co., Chicago investment house, for several years.

Thomas R. Worthen has been appointed manager of advertising and sales promotion for the international division of U. S. Rubber. Mr. Worthen, formerly assistant to the advertising and sales promotion manager, joined the company in 1941.

Joseph Ohzourk has been appointed factory manager of the Chicago Die Mold plant of U. S. Rubber. Mr. Ohzourk, an administrative assistant in the Chicago plastics plant since May, 1952, replaces Esper A. Petersen, who will remain with the company as a consultant. Chicago Die Mold, formerly owned by Mr. Petersen until its sale to the rubber company in October, 1951, is the production center of Enrup and Uscolite, two recent developments in the thermoplastic field.

The Chicago plant also molds other plastics for both consumer and industrial applications and maintains a separate research and development laboratory in Fort Wayne.

Clifford H. Shirley has been promoted to the newly created position of advertising manager of the tire division of U. S. Rubber. Mr. Shirley has been advertising and sales promotion manager for U. S. tires since 1950 and before that had been assistant advertising manager. He has been with the company more than eight years, all in advertising or sales promotion. In his new capacity he will continue to direct the advertising activities of the U. S. tires division and will coordinate advertising for all the tire division.

H. C. Oliver, sales manager of U. S. tires division, last month announced several new transfers and appointments within the division.

Perry L. Watkins, assistant district manager, Portland, Oreg., has been transferred to the same position in Los Angeles; while John C. Barrows, assistant district manager at Atlanta, has been sent to Cincinnati in the capacity of branch manager.

Promoted to assistant district managers were: David S. Latham, truck tire salesman at Charlotte; Gordon A. Hall, truck tire salesman at Boston; and Caswell O. Robinson, salesman at Charlotte (now at Atlanta).

For the Retreading Industry

Economy is the basic justification for tire retreading, according to H. L. Kincade, manager of the camelback and repair materials department of the U. S. tires division. Mr. Kincade covered this topic in an address before the thirty-third annual conference of the National Association of Independent Tire Dealers on October 14 at Cincinnati, O.

Predicting that the retreading industry will grow only "as long as it continues to produce quality retreads at a fair price to make a fair profit," the speaker cautioned that items such as quality of service, safety, appearance, and merchandising are also important considerations. The industry has grown considerably in the past few years, having recorded 8,500,000 retread sales in 1947 and 20,000,000 units in 1952, with an expected 3,000,000 increase for 1953.

Western Insulated Wire Co., Los Angeles, Calif., is completing a 15,000-square foot addition to its new plant, which should be ready for occupancy about November 16.

Changes in Philblack Staff

R. E. Elliott has been appointed assistant to R. J. (Grady) Hull, Phillips Chemical Co. Philblack export sales manager at New York. The chemical company is a wholly owned subsidiary of Phillips Petroleum Co., Bartlesville, Okla.

Elliott joined Phillips in June, 1948, as a chemist at the Bartlesville offices. He was transferred to Akron as office manager in November, 1949, and was made a technical sales representative in December, 1951.

R. N. Hendriksen, who recently joined Phillips Chemical as a technical sales representative, assumes Elliott's former duties and will make his headquarters in Trenton, N. J. Hendriksen has had ten years' experience in the rubber industry, including two years as chief chemist in the Firestone plant at Buenos Aires, Argentina.

These assignments complete recent territorial changes which moved J. A. MacKay from the New England district to Philblack sales division headquarters at Akron, as assistant to George E. Popp, domestic sales manager, and R. B. Robitaille from Akron to the New England area, with offices at Providence, R. I.

New Quaker Rubber Warehouse

A new stock-carrying factory warehouse and sales office has been established at 4384 E. Bandini Blvd., Los Angeles, Calif., by Quaker Rubber Corp., division of H. K. Porter Co., Inc., Philadelphia, Pa., to provide better service and deliveries to customers in the southern Pacific area, it was announced October 8 by G. A. Dauphinais, vice president and general manager.

This branch warehouse will carry Quaker's complete line of industrial rubber products, including rubber conveyor and transmission belting, hose, packing, and miscellaneous rubber products.

The branch is headed by James Joyner.

Improved Acid Hose

The development of a hose reported to be highly resistant to a wider range of acids, salts, alkalies, and other solutions has been announced by Raybestos-Manhattan, Inc., Passaic, N. J. Many solutions previously excluded from transportation by hose, including some highly abrasive slurries, are now claimed to be capable of conveyance by this means.

Both the Condor acid discharge and the Condor acid suction hose are said to have been improved in this way by the use of a special synthetic with other acid-resisting materials for the tubes and covers.

Arizona Chemical Changes

A realignment of sales responsibilities was announced by Arizona Chemical Co., a firm owned jointly by American Cyanamid Co., New York 20, N. Y., and International Paper Co. The company's sales force will now handle, in addition to tall oil derivatives, the Acintene line of crude and refined sulfate turpentine, alpha and beta pinene, and related terpene cuts.

Another change was the movement of Arizona's research and development section to the firm's laboratories at Stamford, Conn.

Arizona's technical sales service laboratory at Linden, N. J., has been enlarged.

Hazacord Cable in Hollywood

A specially constructed portable cable of the Hazard Insulated Wire Works, division of Okonite Co., Passaic, N. J., was service tested recently on the Twentieth Century-Fox production set of "The Robe." The cable contains three conductors arranged in a flat parallel order; extra flexible stranding in a quantity of 3,000 miles per 1,000 feet of cable; and a Hazaprene ZBF sheath. This covering is reported to have withstood severe punishment to a greater degree than any of the standard construction cables previously used.

Movie on Submarine Cable

A sound color film describing the history of the manufacture and laying of a 750,000-pound submarine power cable has been released by Okonite. Titled "Underwater Giant," the 20-minute film covers design and construction of the 7½-mile rubber-insulated cable as well as the assembling, testing, and handling problems involved in its installation across Puget Sound. Some interesting construction figures for the huge conductor include the use of 1,400 miles of copper wire and 18 tons of rubber and a required space of nine freight cars for the single shipping length.

Reeves Brothers Buys Vulcan and Duroflex Firms

Reeves Brothers, Inc., leading textile manufacturer, 54 Worth St., New York 13, N. Y., on October 5 announced acquisition of The Vulcan Rubber Products Corp., Brooklyn, N. Y., and Duroflex, Inc., Buena Vista, Va. Both companies are producers of industrial coated fabrics, and both will become separate corporate subsidiaries of Reeves Brothers, Inc. All assets, properties, machinery, and trade names will come under Reeves ownership and management.

Vulcan was established in 1911. The Kenyon family and other former owners are retiring from the business.

Duroflex was established in January, 1953, by E. C. Hemes, formerly executive vice president of Vulcan, who had been with this company since 1946.

The principals of the new Reeves subsidiaries will be: John M. Reeves, president of Reeves Brothers, who will also assume presidency of both Vulcan and Duroflex; Mr. Hemes, who becomes vice president and general manager of both subsidiaries; and Dale J. McKnight, who joined Vulcan on July 5 as sales manager and now is sales manager for both subsidiaries.

Carl Haas, who joined Vulcan as plant manager on August 1, will continue in that capacity. He formerly was plant manager of Stokes Molded Products, Inc., Trenton, N. J.

The products manufactured include newspaper and offset blankets, gas meter diaphragms, industrial coated fabrics, fuel pump diaphragms, air holding fabrics for inflatable life vests and rafts, and a group of new products now under development.

The research and laboratory facilities will be broadened under the Reeves management. Current plans are to continue operations in both locations.

Henry F. Palmer has resigned as vice president of Kentucky Synthetic Rubber Corp., Darien, Conn. His plans for the future have not yet been announced.

Dayton Adds to Staff

In line with the company's expanded and intensified selling plans, John J. Walsh has been appointed advertising manager, and Robert T. Hollister has been added to the public relations staff as manager, according to A. L. Freedlander, president, The Dayton Rubber Co., Dayton, O. They will be under the direction of Ray Wetzel, director of advertising and public relations.

Walsh has a broad background of advertising and sales promotion experience, including posts as advertising manager of Crosley Motors, Clopay Corp., and Palm Beach Co. He also has had considerable newspaper experience.

Hollister comes to Dayton Rubber with a well-rounded background of public relations and newspaper service. He was public service editor and promotion manager for *Akron Beacon Journal* for eight years and is well acquainted with the rubber industry.

3M Appointments

Donald R. Guthrie recently was named assistant general manufacturing manager of the coated abrasives and related products division of Minnesota Mining & Mfg. Co., St. Paul, Minn., where he formerly was executive engineer in charge of engineering research. After joining 3M as a research chemist in 1939, Guthrie spent five years with the chemical and color laboratory. He then went to the engineering department and has since served as division engineer for the chemical and color division, central research department, new products division, the products fabrication laboratory, and the central manufacturing division. He also has been head of the chemical engineering department.

Donald Kelly has been named regional sales manager of the adhesives and coatings division in Dallas, Tex. Kelly joined 3M in 1949 in industrial sales, covering the Chicago area.

Wire and Cable Symposium

The second annual Wire and Cable Symposium sponsored jointly by the Signal Corps Engineering Laboratories, Fort Monmouth, N. J., and by the wire and cable industry will be held December 14-16 at the Berkeley Carteret Hotel, Asbury Park, N. J. Papers will be presented on characteristics and use of materials, on construction, manufacturing and equipment problems, field construction methods, and on uses in operating systems. Further information on the program is available from H. L. Kitts, Cole Signal Laboratory, Red Bank, N. J.

BWH Forms Texas Sales Unit

The creation of a sales division and the opening of a warehouse to serve the customers of Boston Woven Hose & Rubber Co., Cambridge, Mass., has been announced. Located at 114 Express St., Dallas, Tex., the new facility will be directed toward supplying BWH products to consumers in south central and southwestern parts of the country.

W. H. Merriman will head the new division; while Wiley T. Swearengen is in charge of the office and warehouse.

McNamee and Johnston Upped

The appointment of Raymond W. McNamee as manager of research administration of Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y., was announced October 5 by George O. Curme, Jr., vice president in charge of research. Dr. McNamee will help coordinate research activities of all corporation laboratories where basic research and development is being done on alloys, chemicals, gases, carbons, and plastics. He joined the corporation's chemical research organization at South Charleston, W. Va., in 1933 and, since 1950, has been superintendent of the research and development department of Carbide & Carbon Chemicals Co., a division of Union Carbide. Dr. McNamee, this year's winner of the Herty Medal of the American Chemical Society for "outstanding contributions to chemistry in the Southeast," has played a prominent part in the industrial research on large-scale production processes for styrene, ethylene oxide, and allethrin.

His successor, Franklin Johnston, joined Carbide & Carbon in 1933. In 1938 he was made a research group leader and, in 1951, assistant director of research for the company. As superintendent of the research and development department, Dr. Johnston will be in charge of the company's research center at South Charleston.

Coincident with the advancement of Dr. Johnston was the appointment of Henry C. Chitwood, research group leader, to the position of assistant director of research—organic chemicals. Dr. Chitwood joined Carbide & Carbon in 1934.

Modernizes Headquarters

Wellington Sears Co. recently completed extensive modernization and air-conditioning of its national headquarters building at 65 Worth St., New York, N. Y., at a reported cost of almost $500,000. Situated in the city's textile district, the six-floor structure houses 200 employes of the fabric firm.

The renovation project was begun in January, 1953, at the order of the company's new president, Willfred W. Lufkin, Jr., shortly after he took office. The steadily increasing volume of business done by Wellington Sears is said to have required the modernization, which has resulted in more efficient use of available floor space of the main building and of the company's annex in an adjoining building.

President Lufkin and Advertising Manager J. W. Little in the Former's New Office at Wellington Sears Co.

Allied to Purchase Plaskon

Arrangements have been reportedly completed for the cash purchase of the Plaskon Division of Libbey-Owens-Ford Glass Co. by Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. Plaskon, a producer of plastic molding compounds and resins principally of the urea-formaldehyde type, will be operated within the Barrett Division of Allied Chemical.

The glass company decided to direct its activities into fields more closely related to its major products after concluding that substantial expansion of the Plaskon Division to produce chemicals required for use as raw materials in the production of the plastic materials was necessary. Allied is a producer of such chemical products in addition to manufacturing synthetic resins and plasticizers.

Packaged Detergent Plant

A three-section synthetic detergent plant, reported capable of producing a finished spray dried product from basic raw materials, is being offered by Foster D. Snell, Inc., 29 W. 15th St., New York 11, N. Y. Although designed to complement the other two, each section, sulfonation and neutralization, detergent formulation, and spray drying, is said to be complete within itself. Four standard-size plants, with piping precut according to customer specifications, are available for production of 2,000,000-15,000,000 pounds of dried detergent per year.

A wide range of heavy- and light-duty detergent formulations can be produced with the packaged unit. Another feature of the arrangement is that the sulfonation section may be used for preparing fatty alcohol sulfates as well as more common alkyl aryl sulfonates.

Sinclair Refining Co., New York, N. Y., has formed a new marketing division responsible for the sale of petroleum products that are used as materials in the manufacture of other products. Among the materials to be handled by the organization are waxes, resins, and industrial asphalts. Development of new products for the process industries will also be a function of the division, headed by H. E. Bryson.

Continental Photo Service

Gladding B. Coit

Coit Succeeds Osborn

On September 30, General Latex & Chemical Corp., 666 Main St., Cambridge, Mass., announced the retirement of Kenneth B. Osborn as president. At a recent directors' meeting Gladding B. Coit, executive vice president, was elected president, and Mr. Osborn was named chairman of the board. He will also remain active in company affairs in an advisory capacity.

Arthur B. Newhall, chairman of the board, was named honorary chairman.

Before joining General Latex in November, 1949, Mr. Coit had long been associated with the financial and banking professions. He has been treasurer of the U. S. Mortgage & Trust Co. of New York and of Curtis Wright Corp. During World War II, Mr. Coit was a member of the War Contracts Price Adjustment Board, War Department Price Adjustment Board, and the Reconstruction Finance Corp. Price Adjustment Board.

General Latex is one of the largest importers of natural rubber latex and also is a leading manufacturer of synthetic and natural rubber latex compounds for various end-uses.

Foamtread Shoes

The new line of Foamtread summer casuals of Wellco Shoe Corp., Waynesville, N. C., was presented to the market at the National Shoe Fair in Chicago, Ill., October 25-29. Several types of casuals for men and women, and a new range of summerweight slippers were the features of the 1954 line. Also presented at the Fair was a full color movie depicting the manufacture of Foamtread footwear by a patented vulcanizing process.

Foster Grant Co., Inc., Leominster, Mass., has added to its technical force J. W. LaBelle as director of sales for the petrochemical division, R. B. Bishop as director of research for the petrochemical division, and G. Kovach as product development manager. These plastics engineers, formerly with Koppers Co., Socony-Vacuum Oil Co., and Clopay Corp., respectively, are expected to aid the company in its bid to become a major supplier of plastic raw materials.

Rubber Test Road

Accelerated road testing of Firestone Tire & Rubber Co.'s recently announced Rub-R-Road compound, a synthetic latex material developed by the University of Kentucky under a research contract from the company, is now being conducted on a three-mile stretch of U. S. Highway 31-W, south of Louisville, Ky. Sections of the surfacing compound, containing from 0-10% of the Firestone product, were laid under the supervision of the Department of Highways on the 20-foot wide thoroughfare.

The rubberized asphalt was placed over the old roadway after a record was made of faulty subsoil areas and breaks in the surface and base areas. Traffic over the road approximates a rate of 40,000 vehicles per day, over 40% of which is said to be heavy trucks. The control sections of road, consisting of ordinary asphalt, are alternated with the rubberized portions to give a complete picture of the aging and weathering properties of the Rub-R-Road compound.

Rubber-Tired Pipe Dollies

Pipe launching dollies, consisting of six tires mounted in two rows of three abreast, have been successfully used to complete the laying of two four-mile sections of 20-inch pipe across the Mackinac Strait in northern Michigan. The pipe, which will transport crude oil from Canadian fields to refineries at Sarnia, Ont., was assembled on to the dollies and pulled into the water of the Strait by cranes. More than 350 truck and implement tires manufactured by Firestone were used on these patented devices of the Collins Construction Co.

Harvey Firestone, Jr., Honored

The name of Harvey S. Firestone, Jr., chairman of the Firestone company, was placed in the Hall of Fame of Distribution of the Boston Conference on Distribution at its twenty-fifth annual conference in Boston, Mass., on October 19. Mr. Firestone, selected from nominations made by national trade associations and university schools by a committee headed by K. T. Compton, of Massachusetts Institute of Technology, thus becomes the first executive in the rubber industry to be so honored.

Standards Seminar

J. Gaillard, member of the staff of the American Standards Association and lecturer at Columbia University, New York, N. Y., will hold his next five-day private seminar on industrial standardization from January 25-29, 1954, in the Engineering Societies Bldg., New York. The course will be made up of 10 morning and afternoon sessions, each to consist of one topic presented by Dr. Gaillard and discussed by the class. Begun in 1947, the seminars are intended to help students organize and institute standardization programs in their companies.

Archer-Daniels-Midland Co., Cleveland, O., has appointed Westwood Chemical Co. sales agent for ADM's rubber makers stearic acid in the New York area. L. J. Koch will direct the activities of Westwood's office, at 520 Fifth Ave., New York 36, N. Y.

Fred Wehmer

Wehmer in New Post

A recent addition to the sales department at Rubber & Asbestos Corp., Bloomfield, N. J., is Fred Wehmer, who has been appointed technical sales manager and who will take charge of the technical sales of the adhesive products manufactured by this company. Mr. Wehmer was formerly with Minnesota Mining & Mfg. Co. as technical director of its adhesives and coating division in St. Paul, Minn.

Another addition to the sales department at Rubber & Asbestos is John W. Bruce, Jr., formerly of Industrial Tape Corp. Mr. Bruce is a technical sales representative and will be doing special work with the aircraft industry.

Rubber & Asbestos is expanding its already extensive list of industrial adhesives and will intensify its sales efforts in the industrial field. A program of development of new adhesives, such as those for the aircraft industry, is well under way.

Starts Hexamine Production

Commercial production of hexamethylenetetramine (hexamine) has begun at the Morgantown, W. Va., plant of Mathieson Chemical Corp., Baltimore, Md. Carload quantities of the technical grade, granular material are available.

Hexamine is a colorless crystalline solid made by the reaction of paraformaldehyde and gaseous ammonia. Its principal industrial use is as a source of water-free formaldehyde in the manufacture of phenolic resins, although it is also employed as a stabilizer in plastics and as a vulcanization accelerator in rubber compounding.

Fred F. Van Atta has been appointed special assistant, on the headquarters staff, of American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., and will concentrate his work on coordinating and extending the ASTM developmental and promotional activities, but special assignments will be made from time to time. Mr. Van Atta recently was manager, building division, Carolinas branch, Associated General Contractors; and formerly was acting secretary-treasurer of American Concrete Institute and editor of the *ACI Journal*.

More Tricresyl Phosphate

Production changes designed to increase the output of tricresyl phosphate by 80% have been completed by Monsanto Chemical Co., St. Louis, Mo. The expanded capacity is said to be a result of the growing demand for the chemical, which is used as the principal ingredient in the manufacture of Shell Oil Co.'s gasoline additive TCP and as a plasticizer in the production of vinyl compounds.

Technical Service and Development Program

A $1,250,000 technical service and development program that will include a new research center for customers and industry in the plastics field has been announced by Monsanto at Springfield, Mass. Purpose of the venture is to intensify both short- and long-range search for new markets and new applications, a practice which has proved successful to the plastics division in the past.

Construction of a three-story brick and steel building to provide 44,000 square feet of research area will begin soon, with completion expected in late 1954. Approximately 125 technically trained personnel will be accommodated to direct customer service for product and market development. Technical service engineers in constant contact with customers and their problems will conduct experimental work alongside of staff research personnel at the facility.

Plastic Protects Bananas

Tubes made of polyethylene, product of Bakelite Co., division of Union Carbide & Carbon Corp., New York, N. Y., are being used to protect bananas in transport from dirt and scarring. Fresher products are also a result of wrapping banana bunches in the film at the farms directly after harvest.

According to the United Fruit Co. which employs this method of packaging the tropical fruit for shipment by boat, the bananas arrive less bruised and with a more attractive color and taste than could be accomplished by previous methods. The polyethylene film is supplied in long cylinders wrapped on large rolls; it is then cut to length when needed, slipped over the fruit, and tied at top and bottom for shipment.

Environmental Equipment

Announcement has been made of the formation of the Institute of Environmental Equipment Manufacturers, New York, N. Y., an organization designed to supply technical data on environmental testing to industry. Standardization of equipment for simulating such conditions as low and high temperatures, sand storms, salt-sprays, rain, etc., will be another purpose of the institute, which will maintain a library and publish technical bulletins on this subject.

First Machinery Corp., 157 Hudson St., New York 13, N. Y., which is expanding its engineering staff and facilities in order to service more effectively its new and used equipment departments, has appointed Milton Rabinowitz vice president and general manager of the company. He has had many years of varied business experience in executive capacities.

Record-Playback Process Control

A record-playback control which directs a machine or process cycle from information stored on a magnetic tape is being built by General Electric Co., Schenectady, N. Y., for use on milling machines. The multiple-channel tape recorder used in the control instrument records motion, rather than sound, and serves as a magnetic memory for the machine on which it is installed. For operation, the series of motions necessary to produce a given part is accomplished with the instrument. All except the nonproductive motions are recorded on the magnetic tape by means of electric signals and an electronic circuit. Replay of the tape then duplicates the machine's original motions to produce an identical part.

Economic considerations, such as the requirement that the instrument be individually engineered to suit each installation, makes the control technique expensive. The length of the control cycle depends on the diameter of the magnetic reel. Storage and playbacks of the reel up to 10,000 times are claimed possible without appreciable loss of signal.

In the machine tool field, a representative list of possible applications include milling machines, die-sinking machines, flame cutters, and others. In manufacturing processes, control is claimed possible for valve movement, hydraulic and pneumatic control operation, temperature, pressure, humidity, weight, visual density, conveyor speed, etc.

Rainwear Fashions Exhibited

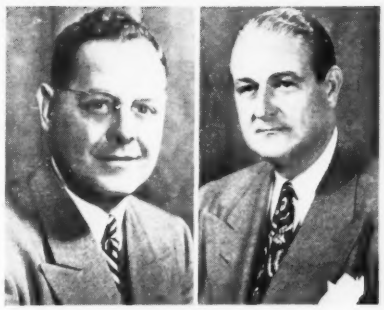
A new line of vinyl rainwear, known as Fosterain, was introduced to buyers and press representatives at a fashion show and cocktail party at the Hotel Pierre, New York, N. Y., on October 13. Developed by L. W. Foster Sportswear, Philadelphia, Pa., the women's garments by Joset Walker are made of The General Tire & Rubber Co.'s Fashon, and the men's apparel by Lou Foster are created of Velon material made by Firestone Tire & Rubber Co.

Some interesting features of the garments included: patterned inside surfaces to give the effect of a reversible coat; a variety of attractive printed and textured outer surfaces; reinforced underarm air vents; and a mink lined woman's coat.

Liquizinc, Anti-Tack Agent

Liquizinc, a highly concentrated zinc stearate dispersion, is reported to be in full-scale production by Rubba, Inc., New York, N. Y. Recommended for use as an anti-tack agent in rubber manufacture, the product is claimed to be capable of being absorbed into the rubber by subsequent milling or compounding operations. In this capacity, the chemical reportedly speeds up dispersion of dry compounding materials without detrimentally affecting the cure or physical properties of the rubber, and facilitates cool and smooth running of the stock without mill-roll slippage. Three gallons of the product are said to make 50 gallons of dust-free tank dip.

Clint Booth has been appointed by Flek Corp., specialist in Kel-F molding and extrusion, 2252 E. 37th St., Los Angeles 58, Calif., general sales manager, to handle its expanded lines of industrial plastics.



Howard M. Dodge John E. Powers

Powers and Dodge Now Veeps

The promotion of John E. Powers and Howard M. Dodge to positions of vice president of The General Tire & Rubber Co., Akron, O., was announced last month by William O'Neil, president and chairman of the board.

Powers joined General in 1934 as a territory sales representative. In 1939 he was promoted to assistant eastern division sales manager and in 1942 to manager of the New York branch, largest of General's branches. He was transferred to the company's Akron headquarters in 1944 as a member of the sales executive staff and in 1946 was named manager of automobile tire sales. In 1951 he was appointed trade sales manager. Powers most recently has been serving as general sales manager of plastics and special products.

Dodge, in the rubber business since 1914, is a veteran of the engineering, development, and production phases of the industry and has been head of General's mechanical goods division. He came to the company in 1936 and started its mechanical goods division. The first plant was acquired at Wabash, Ind., that year, and in 1946 a new plant was built at Logansport, Ind., to augment the company's mechanical and molded goods operation. The third plant under Dodge's direction was placed in operation this year at Marion, Ind., for production of reinforced polyester glass products.

Reversible Furniture Cushions

A new foam rubber cushion for furniture is being marketed by Hewitt-Robins, Inc., Stamford, Conn. Called the Restfoam Economy, the new product is said to be of improved design and of lower cost than the company's Deluxe cushion. The reversible cushion is available in about 25 different shapes and sizes for both period and modern furniture, with thickness of $3\frac{1}{2}$ inches at the box and $5\frac{1}{8}$ inches at the crown.

New Stauffer Sulfur Plant

Construction of a new $1,000,000 plant for the production of Crystex insoluble sulfur has been commenced by Stauffer Chemical Co., 420 Lexington Ave., New York, N. Y. Located at Monongahela, Pa., the facility is scheduled to begin production in May, 1954, utilizing a process developed and improved by the company's research staff. Increasing demand for the product in volumes which can no longer be accommodated by Stauffer's other Crystex plants has required this additional installation.

Timken Sales Offical Retires

George W. Curtis, Milwaukee division sales manager, of The Timken Roller Bearing Co., Canton, O., retired October 1. In confirming the retirement of Mr. Curtis, S. C. Partridge, general manager of the industrial sales division, announced several other changes in the sales organization.

Timken's Milwaukee industrial sales division responsibility has been divided among the district offices in Milwaukee, Minneapolis, and Moline. Robert Morgan, district manager at Moline, continues in that post; while Floyd Hartshorn is the district manager of the Milwaukee office. Donald Van Orman has been appointed district manager of Minneapolis.

Mr. Curtis was with the company 33 years. Prior to becoming division sales manager in 1943, he was the district manager at Milwaukee for 14 years. Curtis plans to live in Fort Myers, Fla., where he has formed a new company, Curtcraft, Inc., a concern that will be closely allied with the farm implement field.

Transferred to Moline earlier this year from St. Thomas, Ont., where he was district sales manager, Morgan has been with Timken 16 years.

Hartshorn, who started with the company in 1937, has been connected with the Milwaukee sales office since 1939 except for service in World War II.

After four years with Timken, Van Orman returned to college to complete his mechanical engineer's degree. After graduation he served in the Army Air Force. He returned to Timken following the war and was moved to the Milwaukee office as sales engineer. In December, 1950, Van Orman was transferred to Minneapolis.

Baker Opens West Coast Office

A new sales office was opened recently by Baker Castor Oil Co., 120 Broadway, New York 5, N. Y., to provide service to customers in the Bay Area of California. Marvin C. Rasmussen is in charge of the new office, at 640 Gilman St., Berkeley, Calif.

Warehouse stocks of Baker products will be maintained at Hawxhurst & Co., Second and Gilman Sts., Berkeley 10, and at W. R. Grace & Co., Second and Berry Sts., San Francisco, Calif.

New Titanium Dioxide Plant

A new plant for the manufacture of titanium dioxide pigments will be built for American Cyanamid Co.'s Calco Chemical Division of Bound Brook, N. J., by Chemical Construction Co., a subsidiary of Cyanamid. To be situated in Savannah, Ga., the facility will supplement other white pigment plants of the company whose production for the rubber and plastics industries is presently short of the demand.

American Polymer Corp., Peabody, Mass., has concluded an agreement with Scott Bader & Co., Ltd., Northants, England, which permits the foreign concern to polymerize emulsions and solutions based on acrylic, vinyl, styrene, acrylonitrile, and vinyl chloride monomers. The English company will specialize in these products for the paint, adhesive, paper, and flooring industries.

Goodyear Anniversary

A three-day homecoming program was held by Goodyear Tire & Rubber Co. in Akron in early October to commemorate the founding of the company 55 years ago. More than 1,700 employes of the rubber company, including some stationed in foreign countries, were present to participate in the event. Discussions of the theme, "Goodyear's Part in the World of Tomorrow," were presented in the form of dramatic stage skits by the firm's executives.

Highlight of the affair was a banquet at which Sir Percy Spender, Australian ambassador to the United States, spoke on American and world business *versus* Communism. A musical review, featuring stage, screen, and television stars, was also presented for executives and for factory and office workers of the company.

Another feature of the Homecoming ceremonies was the presentation to Goodyear of the American Legion's national award for an "outstanding record in employing servicemen and handicapped veterans." The award is presented annually in conjunction with the "National Employ The Physically Handicapped Week" to the employer in each state who offers what is considered to be the best program for employment of war veterans. E. J. Thomas, Goodyear president, accepted the citation on behalf of the company from the Legion's Ohio Commander, H. C. Kingdom.

Long Named Assistant Comptroller

John H. Long, since 1937 manager of general accounting at Goodyear, has been elected assistant comptroller at a meeting of the board of directors. In his new post he also becomes an executive officer of the company.

Long started with Goodyear in the machine shop in June, 1912. Shortly after, he was transferred to factory accounting and in 1920 entered the cashier's department. A year later he was appointed assistant manager of general accounting.

Passenger Conveyor Belt

The Hudson & Manhattan Railroad Co., an underground system serving lower Manhattan and metropolitan New Jersey, has contracted Goodyear and the Stephens-Adamson Mfg. Co. to build a 227-foot moving sidewalk system to serve its passengers. Heralded as the world's first passenger conveyor system, the Speedwalk will be installed in the ramp portion of the connecting tunnel between Erie station and the Hudson tube station in Jersey City.

The rubber conveyor belt will move over a 10% grade at a speed of approximately 1½ miles an hour. Comparable to a flattened-out escalator, the Speedwalk will be equipped with two handrails moving at belt speed and will be capable of reversible operation to accommodate rush-hour crowds.

Corrosion Protection with Geon

The bulb and capillary parts of a Partlow temperature controller, which are immersed in a concentrated phosphoric acid solution at 150° F., are being protected from the highly corrosive effects of the bath by a coating of Geon vinyl resin, product of B. F. Goodrich Chemical Co., Rose Bldg., Cleveland, O. The acid bath is used by Utica Drop Forge & Tool Co., Utica, N. Y., to detect cracks and other defects appearing in jet engine blades. The plastic coated parts are being turned out by Partlow Corp., New Hartford, N. Y.; and the vinyl plastisol formulated of Geon is made by Auburn Button Works, Auburn, N. Y.

Advantages resulting from use of the plastic-coated controller elements include: over a year of service without signs of deterioration (*versus* two to three months of service with lead-coated or stainless steel elements); and adequate thermal conductivity of the plastic without serious thermal lag.

New Carbon Black

Production of Aromex 125, a new superabrasion furnace black reported to deliver as much as 25% more tire mileage, is now under way at the Borger, Tex., plant of J. M. Huber Corp., 100 Park Ave., New York 17, N. Y. It was also announced that additional production of the new black is planned for the company's plant at Eldon, Tex.

Merger Consummated

The proposed merger of Intercontinental Rubber Co., Inc., 50 Broad St., New York 4, N. Y., into Texas Instruments, Inc., Dallas, Tex., was approved by the rubber company stockholders at a special meeting on September 24. Approximately 85% of the outstanding 595,832 shares of stock were voted in favor of the merger, with less than 1,000 shares against.

The stockholders of the Texas company approved the plan in their meeting the next day, and the merger became effective October 1.

Texas Instruments is engaged in the manufacture of electronic instruments and in providing geophysical service for others, principally oil producing companies.

Facilities for the manufacture of guayule rubber in Mexico (chief product of Intercontinental) are being retained at present by Texas Instruments. The future of the guayule factory at Torreon, inoperative since May, 1952, is being studied, but the current level of prices for natural rubber are not conducive to optimism regarding the possibility of resuming guayule manufacture in the near future, according to Dudley G. Browning, Jr., secretary of Intercontinental Rubber.

Public Relations Award

Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J., has received the "Award of Merit" for public relations communications by the New Jersey Manufacturers Association. Presented in conjunction with "The Voice of New Jersey" radio series, the award was given in recognition of the contribution of Calco to the cultural life of the communities in which its employes live.

The radio series, consisting of 13 programs produced by the Association to increase better understanding of the role of industry in the growth, development, and prosperity of the State, recently saluted Calco with a broadcast describing some of the company's achievements since its formation.

New 3M Officers

Election of two new officers was announced October 23 by Minnesota Mining & Mfg. Co., St. Paul, Minn.

Named assistant secretaries were John G. Kruse and Richard L. Post.

Kruse joined 3M as a statistician in 1941. During World War II he headed the company's compliance division in matters concerning WPB regulations. He has been secretary of the company's executive committee since 1946.

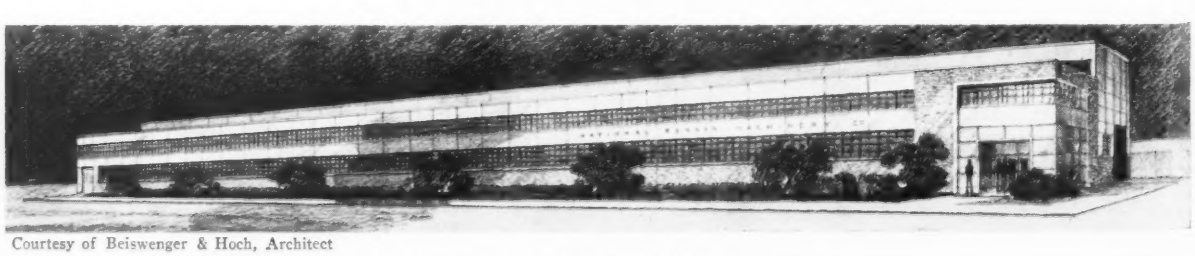
Post started in 3M's legal department following his graduation from the University of Minnesota Law School in 1946.

Play Pond Sales

A doubling in the volume of 1953 sales of Koroseal Floatwall Play Ponds is expected in 1954, according to R. M. Nickels, of Goodrich's sundries sales department. The inflatable vinyl toys, to whose line two new sizes have been added, will gross an estimated $75,000 with the help of the largest advertising campaign in play-pond history.

New NRM Extruder Plant

A $500,000 expansion program consisting of a new plant for manufacturing extruders has been announced by National Rubber Machinery Co., Akron, O. The structure, construction of which has already begun, will measure 400 feet long by 62 feet deep and will contain a plant office and a cafeteria in addition to production facilities. Upon its completion early next year, the plant will house 260 employees and will provide the company with approximately 50% more manufacturing space in the Akron area.



Courtesy of Beiswenger & Hoch, Architect

Architect's Drawing of NRM Plant

NEWS ABOUT PEOPLE

Bassons Adds to Staff

Bassons Industries Corp., 1432 West Farms Rd., New York 60, N. Y., has announced two additions to its staff.

Leon Brettler, formerly with E. I. du Pont de Nemours & Co., Inc., has been put in charge of industrial engineering as assistant to Murray Martin, executive vice president and chief engineer.

Miss Virginia Sommers has been engaged to design a gift and toy line to supplement the company's industrial products. She has had a varied design experience with Lord & Taylor, Sperry Gyroscope Co., Multiple Products Corp., and other manufacturers.

Bassons also advanced Julius M. Medwin to project engineer in charge of thermoplastics.

Two in New Goodrich Posts

Charles C. Martin has been named general credit manager for the Goodrich tire and equipment division, with complete responsibility for all credits, collections, and bookkeeping. Martin has been with the company since 1914. His first job was in the tire engineering department, but a few years later he moved to the treasury department. After two years' service in World War I, Martin, in 1920, returned to BFG as a district credit manager at Atlanta. He transferred to New York in the same capacity in 1925, then to Chicago in 1929, and in 1936 returned to Akron as a staff credit manager in the tire division.

Francis H. Atkins has been named general credit manager for the industrial products division. Atkins joined the company in 1924 in the credit department of the New York district office. He later served as credit manager of the Newark district, then returned to New York for a short time before coming to Akron in 1929. He has since filled a number of supervisory assignments in the credit department.

Mechanized Quality Control System at Hercules Powder

The unique quality control system used by Hercules Powder Co. for the production of pentaerythritol at its Mansfield, Mass., plant was witnessed in action recently by a group of more than 30 representatives of America's leading chemical firms. Utilizing electronic equipment based upon an electric strain cell, the control system consists of remote weighing and handling of the inflammable substance with high quality and uniformity. Hercules officials claim that employment of the control method has resulted in reproducibility, constant control of delicate chemical operations, and graphic records of process conditions.

Rubber Quality

(Continued from page 229)

ship, Eli Grossman, Tumpeer Chemical Co.; program, Hugh Tobey, United States Rubber Co.; publicity, Harold Anderson, General Tire; tickets, Walter Beach, Schacht Rubber Co.; nominating, Jack Stiff, Binney & Smith Co.; and golf outing, Elmo Niccum, Goshen Rubber Co.

Mr. & Mrs. Franklin R. Hoadley En Route to England

Mr. & Mrs. Franklin R. Hoadley sailed on the *S.S. United States* on September 30 for Southampton, England. During a seven-week European tour, Mr. Hoadley, president of Farrel-Birmingham Co., Inc., Ansonia, Conn., plans to visit company customers in England, France, Holland, Italy, Germany, and Sweden. The couple will return on the *S.S. Kungsholm*, due to arrive in New York on December 3.

W. P. ter Horst has established himself as a chemical consultant, with office at McDonogh Rd., McDonogh, Md. Mr. ter Horst has gained his experience as head of organic research, general laboratories, United States Rubber Co.; general manager, Vicara fiber division, Virginia Carolina Chemical Corp.; and as associate director of research, Mathieson Chemical Corp. He also has many patents to his credit including those covering BLE and certain agricultural fungicides.

Herman C. Sehlmeyer recently assumed duties as field merchandiser for the East for the associated tires and accessories division of The B. F. Goodrich Co., Akron, O. His field responsibilities with the division include the application of merchandising programs, retail sales training, budget sales programs, and special assignments. His merchandising background includes budget sales and budget manager experience in the New York area. Successively, Sehlmeyer had served in the BFG New York district as a budget man, territory manager, and store manager. Prior to joining the associated tires and accessories division, he was engaged in the tire business for himself.

William F. Waldeck has been advanced to director of research and development of Wyandotte Chemicals Corp., Wyandotte, Mich., to succeed **Thomas H. Vaughn**, resigned. Dr. Waldeck came to Wyandotte in 1939 from the Columbia Chemical Division of Pittsburgh Plate Glass Co., where he had been acting director of research. He has served Wyandotte as assistant director of technical service, assistant director of research, and director of chemical research.

James E. Caldwell, assistant comptroller of The Goodyear Tire & Rubber Co. since 1946, has joined American Hard Rubber Co., 93 Worth St., New York 13, N. Y., in the newly created position of vice president-finance. His duties will encompass those formerly assigned to Allen H. Ottman, vice president and controller, who has resigned. Caldwell, a certified public accountant in Illinois and New York, is active in the National Association of Cost Accountants and the Controllers' Institute of America and is also a member of the American Management Association and the American Institute of Accountants. For the first 13 years of his career, Caldwell was associated with an accounting firm and next spent three years as treasurer of various units of Mercantile Stores Co., Inc. He subsequently served as consultant with Booz, Allen & Hamilton in Chicago and joined Goodyear in 1941 as assistant comptroller of the Aircraft subsidiary.

Bernard Bory, of the shipping department of Baird Rubber & Trading Co., Inc., 233 Broadway, New York 7, N. Y., was a member of the five-man crew that recently won the world championship in six-meter yacht racing at the international races at Oyster Bay, Long Island.

R. A. Reinke, since 1951 superintendent of Continental Oil Black Co., Westlake, La., has been promoted to technical coordinator of Continental Carbon Co., with headquarters at 1400 W. Tenth Ave., Amarillo, Tex. He will direct the company's Amarillo control and technical service laboratory and function as company liaison officer between plant production and sales. Mr. Reinke started as a chemist at Continental's Sunray, Tex., plant in 1944 and successively occupied positions as assistant superintendent and superintendent of operations both for channel and furnace type units.

Kenneth S. Goodyear has been appointed to manage a newly organized plastics division of Boston Woven Hose & Rubber Co., manufacturer of mechanical rubber goods, Cambridge, Mass. This division will devote itself exclusively to the development and manufacture of vinyl extrusions and new elastomeric products. Mr. Goodyear comes to Boston from United States Rubber Co., where he spent 18 years, most recently as assistant production manager of the international division. From 1949 to 1952 he was factory manager of the Heathhall Plant of North British Rubber Co., Ltd., Dumfries, Scotland. Prior to going to Scotland, he had built and managed, for five years, U. S. Rubber's footwear plant in Cuba. His earlier background has been in industrial engineering, at which he worked from 1935 to 1942 in the Naugatuck, Conn., footwear plant of U. S. Rubber, and from 1942 to 1944 he was with Hodgman Rubber Co.

T. G. MacGowan, since 1939 manager of the marketing research department of The Firestone Tire & Rubber Co., Akron, O., was honored October 19 at the twenty-fifth annual Conference on Distribution in Boston. Mr. MacGowan personnaly received a citation for his work in promoting more effective distribution.

W. W. Knight, Jr.

W. W. Knight, Jr., has been named vice president, Barrett Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. For the past seven years Mr. Knight has held executive positions with Libbey-Owens-Ford Glass Co., Toledo, O. Previously, for 11 years, he had been with Michigan Alkali Co. Mr. Knight, with the exception of his service during World War II in the Ordnace Department, U. S. Army, has given all of his active business years to the chemical industry. He is also a member of the plastics committee of the Manufacturing Chemists' Association. As vice president of the Barrett Division, Mr. Knight will be in charge of Barrett's industrial resin program. Since the acquisition of Plaskon, Barrett, a leading producer of basic coal-tar chemicals, roofings, protective coatings, and paving materials, is now in a position to offer alkyd, urea-formaldehyde, polyester, polyvinyl, terpene, and phenolic plastic resins to its customers.

Howard R. Erwin last month was appointed deputy director of the Office of Synthetic Rubber by RFC Administrator Kenton R. Cravens. Mr. Erwin succeeds **J. Ernest Miller,** who has returned to the B. F. Goodrich Chemical Co. Mr. Erwin formerly was manager of the government synthetic rubber plant at Louisville, Ky., operated by Kentucky Synthetic Rubber Corp. Prior to this work he had served with the Goodyear Tire & Rubber Co. in production and sales work from 1943 to 1950.

Frank T. Magennis, since 1944 vice president of Goodyear Export Co., Akron, O., has been awarded the French Legion of Honor for his outstanding work with the International Road Federation. Mr. Magennis is chairman of the board of the IRF, which assists national road associations in promoting road building among the public and governments around the world. The IRF also collects and distributes technical, economic, statistical, and other educational materials relative to the benefits derived from good roads and supports advance training in highway engineering.

John L. Connolly, secretary and general counsel of Minnesota Mining & Mfg. Co., St. Paul, Minn., recently was elected president of the National Tax Association.

Walter T. Meinert

Walter T. Meinert has been appointed assistant director of the development and service department of Emery Industries, Inc., Carew Tower, Cincinnati 2, O. He has been a member of this department for the past four years, during which time he has been active in both the development of new products and technical service activities concerning Emery's fatty acids, plasticizers, and textile products. Currently he is a member of the American Chemical Society, American Association of Textile Chemists & Colorists, and the American Oil Chemists Society.

Charles Mayer Studios

Dawson P. Wilson

Dawson P. Wilson has been appointed a sales representative, with headquarters at 335 S. Main St., Akron, O., for Sid Richardson Carbon Co., Fort Worth, Tex. Mr. Wilson first was employed (in 1928) by The B. F. Goodrich Co. Then, in 1935, he became associated with Firestone Tire & Rubber Co., where he remained until 1940, when he entered the Armed Services. Upon his return to mufti Mr. Wilson in 1945 joined The General Tire & Rubber Co. His work with the various rubber companies covered technical development and technical sales as well as foreign plant operations.

Cecil W. Humphreys

Cecil W. Humphreys has been appointed vice president in charge of manufacturing for Shell Chemical Corp., 50 W. 50th St., New York 20, N. Y. He had previously been general manager and manager of development for the company's manufacturing department. In 1932, Dr. Humphreys started with Shell Chemical as a laboratory assistant at its Pittsburg, Calif., plant and later worked as chief chemist at the Martinez, Calif., plant. Subsequently he became assistant superintendent of the Dominguez plant. He moved to Houston, Tex., in 1941, to act as manager of the chemical plant there from its start through the war years. In 1946 he became manager of operations nation wide in Shell Chemical's manufacturing department.

John Liljegren, chief chemist of Pioneer Rubber Mills, San Francisco, Calif., for the past 33 years, retired November 1.

Ralph M. Gattshall, with the Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown, O., for 31 years, retired November 1. Gattshall is well known by manufacturers and distributors throughout the country. In 1931 he helped organize the Joint Merchandising Committee of the National Industrial Distributors' Association, the Southern Industrial Distributors' Association, and the American Machinery & Supply Association. Taking a leave of absence from his position of advertising manager of the Republic Rubber Division, he served from 1931 to 1933 as executive manager of the Committee. He came to Republic from The B. F. Goodrich Co. in March, 1922, and was appointed zone manager in Kansas City. He later served as zone manager in Chicago and Youngstown and then became advertising manager. After his return from his Joint Merchandising Committee duties, he was made manager of distributor sales. In 1936 he became Republic's first district manager and opened a new southern district, with headquarters in Atlanta, Ga.

Frank Grilli has joined the New York branch sales office staff (122 E. 42nd St.) of Diamond Alkali Co., Cleveland, O. Active for many years with Innis, Speiden & Co., importer, exporter, and manufacturers' agent of industrial chemicals, colors, and allied products, Grilli was most recently manager of its resale chemical department.

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William M. Spaulding, one-time assistant general freight agent, Chicago, Rock Island & Pacific Railroad, has been appointed traffic manager, Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill., sole manufacturer of the insecticides Chlordane and Heptachlor and also producer of resins, solvents, and other petrochemicals. Subsequent to leaving Rock Island and before coming to Velsicol, Spaulding had served as traffic manager with Pettibone-Mulliken Co. and Continental Can Co.

James F. Eversole has been named vice president in charge of research of Bakelite Co., a division of Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y. Dr. Eversole joined Union Carbide in the research organization of Carbide & Carbon Chemicals Co. at Niagara Falls as a research chemist in 1929. Several years later he was assigned to the laboratories of Linde Air Products Co., another company division. In 1943 he was appointed superintendent of Linde's laboratories at Tonawanda, a position he held until 1951, when he moved to New York to become manager of research administration of Union Carbide, in which capacity he was responsible for coordination of the research activities of all the corporation laboratories where basic research and development work is being done on alloys, chemicals, gases, carbons, and plastics.

James E. MacDonald, Jr., vice president of Goodall Rubber Co., Inc., Trenton, N. J., has accepted the chairmanship of the Rubber Division of the 1954 Greater New York $4,000,000 campaign for the National Foundation for Infantile Paralysis.

CANADA

Dunlop Erecting Another Plant

Plans for immediate construction of an ultra-modern tire manufacturing plant at Whitby, Ont., by Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., were announced October 20 by J. P. Anderson, president and general manager.

The new plant is expected to be in operation by the Spring of 1955 and will initially employ about 200 people. It will enable the company, Mr. Anderson said, substantially to increase its output of truck and passenger-car tires.

Total consumption of such tires in Canada has increased by 205% in the last 20 years and by 38% in the last six years, Mr. Anderson stated. Continued population growth and the use of more trucks and cars per capita indicate a possible further rise of another 50% by 1962, he added.

Dunlop started manufacturing in Canada in 1894 and has been making tires at its Toronto works since 1905. Some of these operations are to be transferred to Whitby to make room for increased production of rubber belting, hose, and other rubber items for use in textile, mining, and other industries, Mr. Anderson explained.

The new plant will be in Whitby's new heavy industry zone on a 56-acre site just east of Brock St. and south of Highway 401 and the C.N.R. tracks.

Of single-story construction, the plant will feature an extensive use of glass, aluminum panel facings, and interior color dynamics. The new equipment already on order for it includes the most modern high-pressure mixing units and batteries of automatic shaping and curing machines of a kind never before used in production in the Dominion.

The Whitby plant will be a further addition to an extensive list of plants built by the world-wide Dunlop organization in the last five years. The others include new plants in Brazil, Germany, New Zealand, France, Great Britain, and South Africa.

New Research Lab of Polymer Corp.

Canadian Firms Fined

Goodyear Tire & Rubber Co. of Canada, Ltd., Dominion Rubber Co., Ltd., Dunlop Tire & Rubber Co., Ltd., Gutta Percha & Rubber, Ltd., and B. F. Goodrich Rubber Co. of Canada, Ltd., all pleaded guilty to a charge of conspiring to operate a combine and to fix prices from 1936 to October 31, 1953, with "one another and with Barringham Rubber & Plastics, Ltd., G. L. Griffith & Sons, Ltd., Viceroy Mfg. Co., Ltd., Firestone Tire & Rubber Co. of Canada, Ltd., and Canalco, Ltd."

Mr. Justice Treleaven, judge of the suit brought by the Canadian Government against the five rubber companies, fined each of the firms the maximum amount of $10,000 plus costs and granted a court order restraining the companies from further combine or price fixing activities. A spokesman for counsel representing the rubber companies asked for a stay of execution of the injunction for 30 days, stating that an appeal on this point would be made. The firms contend that the case did not warrant such an order, and that "legislation respecting such orders of prohibition is invalid."

A recent amendment to the law under which the case was tried permits the amount of the fine in such suits to be set at the discretion of the judge. In this instance, however, the date of the offense required the punishment to conform to the law as it existed at that time. The conspiracy for control of "the whole area of mechanical rubber goods sales" is said to have lessened competition in the fields of conveyor and transmission belting, hose and miscellaneous industrial products, including in the latter grouping printing and industrial rubber-covered rolls and roll coverings; tank, trough, and pipe linings; mats, matting, and floor coverings; packing and weather stripping; and tubing.

Polymer Research Laboratory

The new research laboratory building of Polymer Corp., Ltd., Sarnia, Ont., was officially opened on September 29 by J. D. Barrington, president of the corporation. Emphasizing that "the dependency of any progressive industry on research is an accepted fact," Mr. Barrington cited the monetary outlay of the government owned firm as proof of Polymer's belief in this policy. Representatives of industry, commerce, government, construction, and associated rubber firms present at the ceremony were conducted on a tour of the new building prior to an informal reception which took place at the Sarnia Riding Club.

The research and engineering staffs of Polymer designed the structure with detail help from the engineering firm of Giffels & Vallet of Canada, Ltd. Investigation in the synthetic rubber field will be the prime concern of the $1,250,000 facility which contains 20 laboratory areas, a large and modern library, and a small but specialized machine shop. Feature of the laboratory section is an electron microscope for studying the internal structure of materials.

This step in the development of a national research program was considered necessary, according to E. J. Buckler, director of research and development for Polymer, now that Canada has advanced in maturity in various industrial fields.

Rubber Use Declines

Combined consumption of rubber in Canada—natural, synthetic, and reclaim—was 16% lower in August than in the preceding month, but there was a small rise in month-end stocks. Production of synthetic and reclaim both climbed.

Consumption during the month totaled 5,589 tons, against 6,567 a month earlier, with natural rubber at 2,450 tons (2,710 in July); synthetic, 2,243 (against 2,795); and reclaim, 896 (1,062). Month-end stocks amounted to 9,744 tons, against 9,585, comprising 4,109 tons of natural (against 4,685 in July); 4,112 tons of synthetic (3,497); and reclaim, 1,523 (1,403).

Domestic production of synthetic rubber in August amounted to 6,436 tons (4,403 in July), and the month's output of reclaim totaled 356 tons (329).

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OBITUARY

Albert B. Cunnington

AFTER several months of failing health Albert B. Cunnington, 89, oldest active Goodyear Tire & Rubber Co. employe and a veteran of more than 55 years with the firm, died October 1 in an Akron, O., hospital.

Cunnington joined Goodyear on September 23, 1898, when the company was just getting started. His initial job was that of the company's first receiving clerk. As Goodyear grew, he later had charge of compounds, crude rubber, fabric, coal, and supplies. He also was the first full-time secretary of the Goodyear Relief Association, holding that position for five years. In 1938 he was assigned the job he held until time of his death, that of the company's official greeter and receptionist in the main office lobby.

Born in England, he came to Akron at the age of five and later attended Akron schools and night business school.

Cunnington was a member of the East Market St. Church of Christ and of the Odd Fellows Lodge, in which he held all offices. During his earlier years he also was a member of the Akron city fire department and helped organize the first fire-fighting squad at Goodyear. He served as assistant fire chief for the company 16 years.

The deceased is survived by two daughters, two sons, five grandchildren, and 10 great grandchildren.

Funeral services were held October 4.

J. Paul Stanley

J. PAUL STANLEY, district field representative for the associated tire and accessories division of The B. F. Goodrich Co., died in Akron, O., on September 19, as a result of injuries which he had received in a traffic crash on September 11. Stanley had headed sales activities for the Hood, Miller, Diamond, and Brunswick tire lines in central and eastern Ohio, western Pennsylvania, and northern West Virginia.

He had joined Goodrich in November, 1949, after a 34-year career in tire and insurance work with varied companies.

A native of Scranton, Pa., he had lived in Akron most of his life.

The deceased attended the University of Michigan and was a veteran of World Wars I and II.

The widow survives.

FINANCIAL

Boston Woven Hose & Rubber Co., Cambridge, Mass. Year ended August 31, 1953: net earnings, $208,746, equal to 48¢ a common share, contrasted with $636,159, or $1.72 a share, in the preceding fiscal year; sales, $18,713,387, against $20,684,335; provision for income taxes, $207,300, against $614,000; current assets, $7,474,030, current liabilities, $1,252,825, compared with $6,523,355 and $1,935,236, respectively, on August 31, 1952.

The Aetna-Standard Engineering Co., Pittsburgh, Pa., and subsidiary. Year ended June 30, 1953: net income, $923,428, equal to $2.40 a common share, compared with $774,285 in the preceding fiscal year; net sales, $27,338,685, against $20,520,387; taxes, $992,000, against $1,013,000; reserve for depreciation, etc., $338,234, against $267,278; current assets on June 30, 1953, $7,125,779; current liabilities, $4,698,685.

American Cyanamid Co., New York, N. Y., and wholly owned subsidiaries. First three quarters, 1953: net earnings, $21,043,438, equal to $2.44 each on 8,640,352 common shares, against $19,024,726, or $2.23 each on 8,537,979 shares, in last year's quarters; net sales, $287,301,694, against $271,733,740.

Carborundum Co., Niagara Falls, N. Y., and domestic and Canadian subsidiaries. First nine months, 1953: net income, $4,744,416, equal to $3.06 each on 1,548,505 common shares, contrasted with $3,577,440, or $2.34 each on 1,528,000 shares, in the 1952 period; net sales, $63,050,557, against $50,926,631.

Diamond Alkali Co., Cleveland, O. First three quarters, 1953: net profit, $4,703,476, equal to $1.90 each on 2,263,803 common shares, contrasted with $3,795,362, or $1.50 each on 2,261,503 shares, a year earlier; net sales, $65,507,099, against $57,169,091.

Dow Chemical Co., Midland, Mich., and subsidiaries. Quarter ended August 31, 1953: net income, $9,762,957, equal to 43¢ each on 22,007,010 common shares, compared with $7,939,889, or 36¢ each on 6,999,447 shares in the 1952 quarter; net sales, $110,503,775, against $93,938,024.

Monroe Auto Equipment Co., Monroe, Mich. Year ended June 30, 1953: net income, $573,718, equal to $1.33 a share, contrasted with $256,268, or 49¢ a share, in the preceding fiscal year.

Eagle-Picher Co., Cincinnati 1, O. Nine months ended August 31, 1953: consolidated net profit, $2,492,693, equal to $2.52 a share, against $2,255,529, or $2.28 a share, in the 1952 period; net sales, $66,581,893, against $56,561,593.

Firestone Tire & Rubber Co., Akron, O., and subsidiaries. Nine months to July 31, 1953: net income, $32,626,278, equal to $8.21 a share, compared with $29,099,954, or $7.35 a share, in the like period last year; net sales, $747,090,554, against $669,129,079.

General Electric Co., Schenectady, N. Y. Nine months to September 30, 1953: net earnings, $116,386,000, equal to $4.03 a common share, contrasted with $94,750,000, or $3.28 a share, in the like period last year; sales, $2,341,048,000, against $1,813,490,000.

General Tire & Rubber Co., Akron, O. Nine months to August 31, 1953: net profit, $5,505,856, equal to $4.34 each on 1,205,953 common shares, compared with $4,449,570, or $3.48 each on 1,199,169 shares, in the corresponding period last year; net sales, $153,842,551, against $132,761,695.

National Automotive Fibers, Inc., Trenton, N. J. Nine months to September 30, 1953: net income, $2,599,402, equal to $2.61 a common share, against $1,402,272, or $1.41 a share, in last year's period.

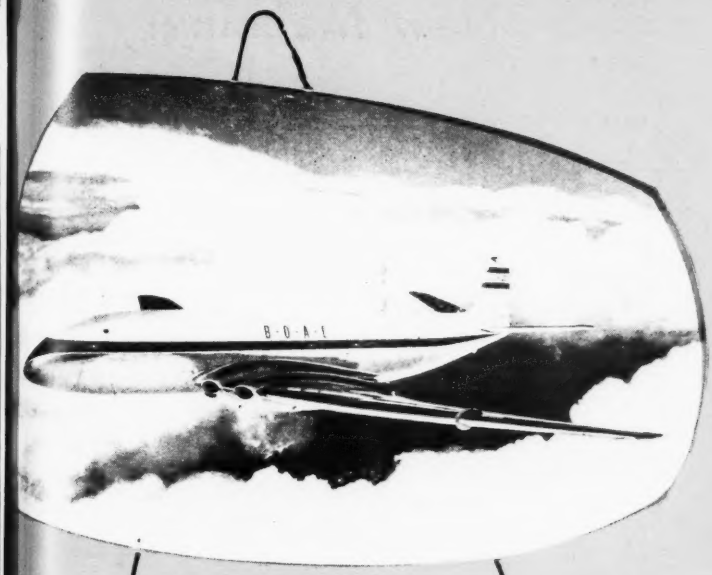
O'Sullivan Rubber Corp., Winchester, Va. Nine months ended September 30, 1953: net profit, $107,462, equal to 21¢ a common share, against $114,223, or 23¢ a share, a year earlier.

U. S. Rubber Reclaiming Co., Inc., Buffalo, N. Y. Thirty-six weeks to September 13, 1953: net income, $135,550, against $144,080 a year earlier.

(Continued on page 276)

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
American Hard Rubber Co.	Pfd.	$0.87½ q.	Sept. 30	Sept. 22
Armstrong Cork Co.	Com.	0.75	Dec. 12	Nov. 6
	$3.75 Pfd.	0.93¾ q.	Dec. 15	Dec. 1
	$4.00 Pfd.	1.00 q.	Dec. 15	Dec. 1
Baldwin Rubber Co.	Com.	0.15 q.	Oct. 26	Oct. 15
		0.10 extra	Oct. 26	Oct. 15
Boston Woven Hose & Rubber Co.	Com.	0.20 q.	Nov. 25	Nov. 13
Crown Cork & Seal Co.	$2.00 Pfd.	0.50 q.	Dec. 15	Nov. 17
Detroit Gasket & Mfg. Co.	Com.	0.25 q.	Oct. 26	Oct. 9
DeVilbiss Co.	Com.	0.30 q.	Oct. 20	Oct. 9
Firestone Tire & Rubber Co.	Com.	0.75	Oct. 20	Oct. 5
		0.75 extra	Dec. 1	Oct. 5
	Pfd.	1.12½ q.	Dec. 1	Nov. 16
General Motors Corp.	$3.75 Pfd.	0.93¾	Nov. 2	Nov. 16
	$5.00 Pfd.	1.25 q.	Nov. 2	Oct. 5
Goodall Rubber Co.	Com.	0.15 spec.	Dec. 15	Dec. 1
Goodall-Sanford, Inc.	4% Pfd.	1.00 q.	Dec. 1	Nov. 16
	6% Pfd.	0.75 q.	Dec. 1	Nov. 16
Goodyear Tire & Rubber Co.	Com.	0.75 q.	Dec. 15	Nov. 16
	$5.00 Pfd.	1.25 q.	Dec. 15	Nov. 16
Jenkins Bros.	Pfd.	1.00	Sept. 30	Sept. 11
	Non-Vot.	0.25	Sept. 30	Sept. 11
Lea Fabrics, Inc.	Com.	0.37½	Nov. 30	Nov. 6
Lee Rubber & Tire Corp.	Com.	0.75 q.	Oct. 30	Oct. 15
		0.50 extra	Oct. 30	Oct. 15
		Stock (5%)	Oct. 30	Oct. 15
Okonite Co.	Com.	0.50	Nov. 2	Oct. 13
O'Sullivan Rubber Corp.	Com.	0.05	Oct. 15	Sept. 25
	Pfd.	0.25 q.	Oct. 1	Sept. 22
Parke, Davis & Co.	Com.	0.35	Oct. 30	Oct. 9
A. G. Spalding & Bros., Inc.	Com.	0.25 q.	Dec. 15	Nov. 25
		Stock (2%)	Dec. 15	Nov. 25
S. S. White Dental Mfg. Co.	Com.	0.37½ q.	Nov. 19	Nov. 2
Whitehead Bros. Rubber Co.	Com.	0.15 extra	Dec. 15	Dec. 1



IN AIR TRANSPORTATION . . .

BOAC's De Havilland Comet—the world's first jet commercial airliner is the forerunner of the latest advance in luxurious air transportation. Its 500 m.p.h. speed further reduces our rapidly shrinking globe.

Setting new standards of **PROGRESS**

IN THE RUBBER INDUSTRY . . .

Constant advancement in service and progressive business management are the reasons why Muehlstein is a leading supplier to the rubber industry today as it has been for over 40 years.

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BAIRD RUBBER
AND TRADING COMPANY, INC.
ESTABLISHED 1903
233 BROADWAY, NEW YORK 7, N. Y.
WOrth 4-1460
FOR DEPENDABLE SERVICE ON ALL YOUR RUBBER REQUIREMENTS

New Machinery

Pressure Cells

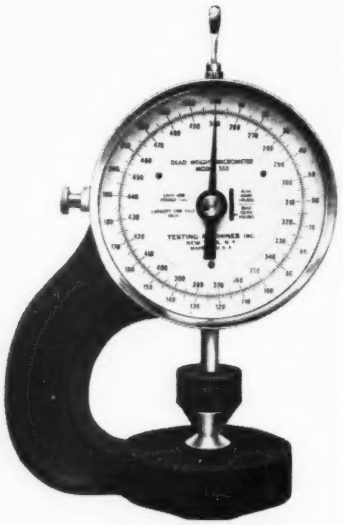
NEW high-frequency cells, designated SR-4 Type HF, have been developed by Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa., for use in measuring pressure changes of fluids. The units consist of a pressure-sensitive tube, on the outside of which special strain gages are bonded. Movement of the tube walls is recorded by means of high-frequency response through an oscilloscope or oscillograph, although measurement is also possible by electrical indicators or recorders of the potentiometer type.

Baldwin High-Frequency Pressure Cells

Measuring approximately 5½ inches in overall length and two inches in diameter, the new pressure cells reportedly feature fast response to pressure variations; high accuracy and sensitivity; rugged construction; long fatigue life; and temperature compensation to prevent changes of zero and sensitivity. Static pressure measurements can also be obtained with high accuracy, it is reported, in a temperature range from —60 to 150° F., although other types of cells are usually preferred for this purpose.

Manufactured in five standard capacities of 1,000, 2,000, 5,000, 10,000, and 20,000 psi., these SR-4 HF units are designed for 50% higher output, using voltages as high as 25 volts.

Double-Duty Micrometer


T. M. I. Micrometer

A MICROMETER, designed for both the precise requirements of the laboratory and the rugged handling of production work, is being manufactured and marketed by Testing Machines, Inc., New York, N. Y. Known as Model 553, the new product permits readings of 0.0005-inch from the six-inch dial, which is calibrated in increments of 0.001-inch up to ½-inch.

Constructed with a cast-iron base and with anvils of stainless steel, the dead weight load of the standard model is eight psi. Other units can be made with different dead weights and anvil sizes and can be manufactured to conform to ASTM specifications. Long life in heavy-duty applications and resistance to vibrations are also claimed for the micrometer.

Heavy-Duty Granulator

A NEW Model 20 heavy-duty granulator, built to reduce plastic parts that are too heavy in cross-section for conventional granulating machines, is made by Cumberland Engineering

Extrudes or strains 10 to 25% more rubber

. . . with help of TIMKEN® bearings

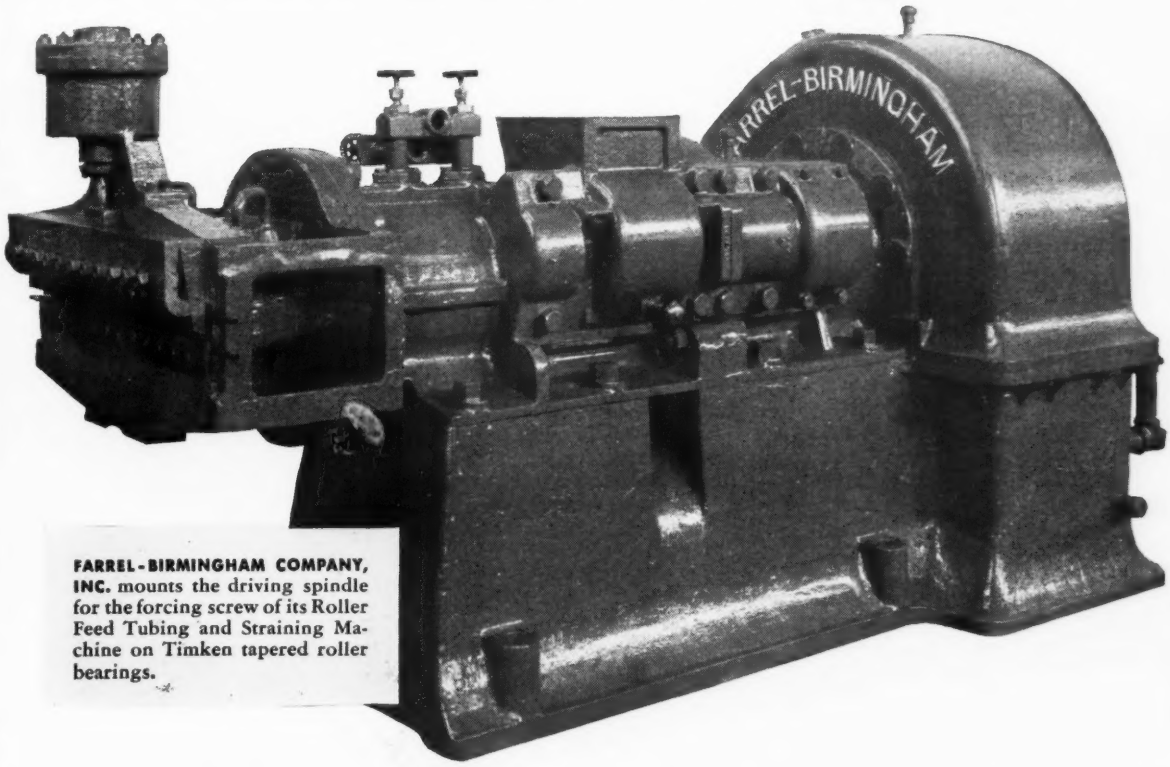
WITH an exclusive feature—roller feed—Farrel-Birmingham claims that its Roller Feed Tubing and Straining Machine ups tire tread production 10-25%!

Here's how it works: A roller feeds stock to a forcing screw under constant pressure. Surface speed of the roller is slightly greater than that of the screw, so rubber is continuously crowded into the screw. This crowding action eliminates trapped air, keeps constant amount of stock in the extrusion chamber at all times, assuring extruded sections of greater density and uniformity. With slight modification, the machine can also be used as a strainer.

For a very good reason, the forcing screw itself is driven by a spindle mounted on Timken® bearings. In extruding tire treads, the forcing screw carries heavy thrust loads. If ordinary radial bearings were used, a large and costly thrust bearing would be needed. But Timken bearings' tapered construction enables them to take these heavy thrust loads, as well as the radial loads of the screw. They eliminate the need for a separate thrust bearing—simplifying design and reducing maintenance.

To get the advantages only Timken bearings can give, specify them for the machines you build or buy. Always look for the trade-mark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

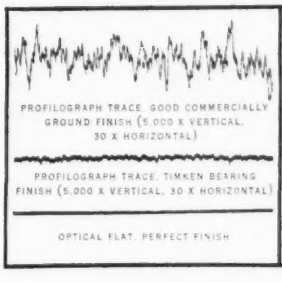


FARREL-BIRMINGHAM COMPANY, INC. mounts the driving spindle for the forcing screw of its Roller Feed Tubing and Straining Machine on Timken tapered roller bearings.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS


PROFILOGRAPH TRACE, GOOD COMMERCIALLY GROUND FINISH (5,000 X VERTICAL, 30 X HORIZONTAL)
PROFILOGRAPH TRACE, TIMKEN BEARING FINISH (5,000 X VERTICAL, 30 X HORIZONTAL)
OPTICAL FLAT, PERFECT FINISH

SMOOTH TO MILLIONTHS OF AN INCH

Surface finish of high quality Timken bearing rollers and races is so smooth that it takes a profilograph to measure its smoothness. This instrument measures surface variations to a millionth of an inch, as shown at the left.

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ↕ AND THRUST →▯← LOADS OR ANY COMBINATION →✳←

FAST DELIVERIES

Fast deliveries plus exceptional performance make EEMCO Mills and Presses your best buy. Save weeks of valuable production time. Some sizes are available for immediate shipment.

MILLS

for processing rubber and plastics, including LABORATORY MILLS for experimental work.

PRESSES

for compression, lamination, transfer and reinforced plastics molding —also LABORATORY PRESSES for experimental work.

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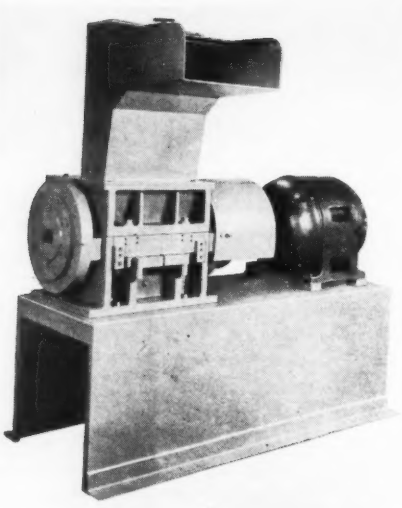
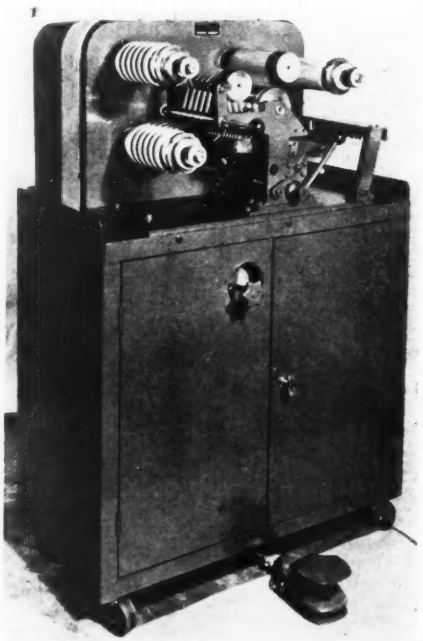


Cumberland 20-Inch Granulator

Co., Providence, R. I. The machine can reportedly handle cylinder purgings from injection molding machines, bleeder scrap from extrusion machines, and heavy-cast slabs of polystyrene or acrylic resins. Made with a throat opening measuring eight by 20 inches in area and with an extra-large flywheel, the unit can eliminate preliminary granulating operations such as cutting and band-sawing.

Model 20 is said to be constructed of steel with heavy steel weldments in order to reduce damage to the machine frame and cutting chamber parts from hard foreign material entering with the feed. Other construction features of the machine include hardened and ground seal rings employed internally and externally; rugged rotor element to which knives are attached; and direct drive from a 40-hp., 1,200 rpm. motor.



Dusenbery Bench Slitter and Rewinder

Slitter and Rewinder

A NEW slitter and rewinder, Model 618-AB, consisting of four rolls plus rewind mandrels, has been developed by John Dusenbery Co., Inc., Verona, N. J., for use in cutting pressure-sensitive tape such as cellophane, polyethylene-coated cloth, etc.

Specify Plastolein Plasticizers...

—for VINYLS

—for CELLULOSICS

—for SYNTHETIC RUBBERS

Emery Monomeric plasticizers are noted for their low temperature properties . . . . . their stability to light and heat . . . . and their outstanding resistance to oxidation and rancidity. Practically water-white . . . they have low pour points, low specific gravities and low volatilities.

The Polymeric types are special polyesters that are designed to supply permanence and durability. Although Polymeric in nature, they are sufficiently fluid at normal temperatures to be handled in bulk with ordinary equipment.

Check these Plastolein Plasticizers for those applicable to your Operation—

PLASTOLEIN 9050 DHZ

(di-2-ethylbutyl azelate)—a highly-efficient specialty plasticizer for high clarity films, coated fabrics, extrusion compounds and other elastomers where low-temperature flexibility is essential. Excellent for the viscosity control of dispersions.

PLASTOLEIN 9058 DOZ

(di-2-ethylhexyl azelate)—a good all around basic plasticizer that also imparts excellent low temperature properties. Its outstanding combination of properties leads to its use in any vinyl product. Also advantageous for nitrile and GRS rubbers.

PLASTOLEIN 9057 DIOZ

(di-iso-octyl azelate) a good basic, primary plasticizer for all vinyl formulations. For all practical purposes, its performance is the same as that of Plastolein 9058 DOZ and both can be used interchangeably.

PLASTOLEIN 9055 DGP

(diethylene glycol dipelargonate)—a general purpose auxiliary plasticizer for imparting low-temperature flexibility, excellent "hand" and drape to vinyls. Also, an outstanding low-temperature plasticizer for Neoprene and Buna-N rubbers.

PLASTOLEIN 9250 THFO

(tetrahydrofurfuryl oleate)—a fatty type plasticizer of unusual stability, providing internal lubrication for superior processing. Also imparts excellent "hand" and drape to films and sheeting. Its relatively low cost makes it attractive for cellulosics, particularly nitrocellulose, and synthetic rubbers.

PLASTOLEIN 9715, 9720 POLYMERIC

These Polymeric Plasticizers impart extreme durability and weatherability to plastic materials, yet exhibit the low-temperature characteristics and high efficiency of most monomeric plasticizers. They are compatible with the vinyls, cellulosics and synthetic rubbers. Prolonged exposure to heat and ultraviolet light does not result in appreciable discoloration, stiffening, or sweat-out.

Emery

Fatty Acids & Derivatives
Plastolein Plasticizers
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Emery Industries, Inc., Carew Tower, Cincinnati 2, Ohio
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See us at Booth No. 718
24th Exposition of
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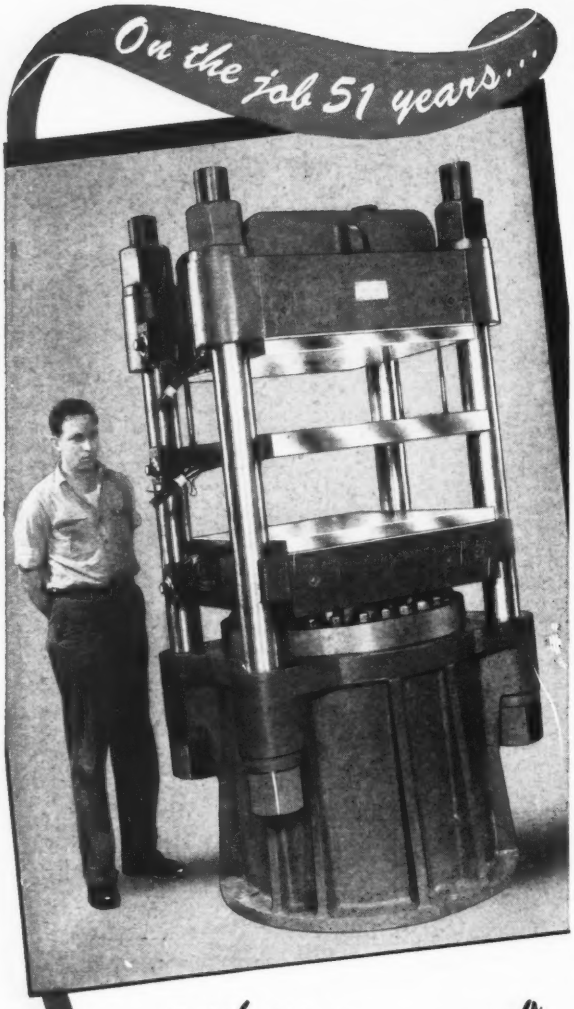


...and still pressing

The **HOLMES**
HYDRAULIC PRESS

Fifty-one year old original models still operating efficiently--every day

YES, it's a fact! Original models of The Holmes Hydraulic Press--installed 'way back in 1901--are still producing day after day in big name rubber plants throughout the U. S. A. This amazing, half-century performance record is positive proof that The Holmes Hydraulic Press is an outstanding investment in--Uninterrupted Production...Minimum Maintenance...and...Maximum Output.

WRITE OR WIRE FOR SPECIFIC DETAILS—regardless of your particular requirements. With 51 years know-how specializing in machinery and molds for the rubber industry--Holmes can help you solve your problems, too, as they have for so many others. No obligation, of course.

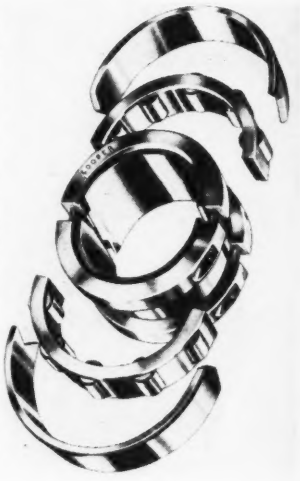
Stanley H. HOLMES Company
Successor to Holmes Bros., Inc.
440 N. Sacramento Blvd., Chicago 12, Ill.

In operation, the rolled uncut tape passes from the supply roll over the first pull roll and around the slitting roll, which contains standard score cuts. Levers of adjustable pressure force hardened bevel-edged knives against the score cut roll, slitting the passing material to widths from ¼-6 inches. The slit tape then passes over another pull roll, over stabilizing idlers, and on to rewind mandrels. Both pull rolls are knurled for easy release of sticky tape.

Roller chains and gears drive the machine from a ¾-hp. motor. The rolls, which measure either three or four inches in diameter, have a maximum rewind diameter of seven inches; a maximum supply roll diameter of 10 inches; a maximum length of six inches; and a maximum speed of 180 feet a minute. Elimination of trimming operations and reduction in set-up costs are advantages expected to be gained from use of the machine.

Split Roller Bearings

SPLIT roller bearings, as made by Cooper Split Roller Bearings Corp., Pittsburgh, Pa., are composed of a base, a roller section, and a collar, each of which is split along the axis of the shaft to which it is attached. The halves of the base which contains the inner race are clamped on to the shaft with locking collars; the bearing halves are placed in the base's outer race; and the split cartridge or other housing is fixed around the bearings. The surfaces on which the bearings move are split on a diagonal to insure continuity of the contact area.



Components of Cooper Split Roller Bearing

Recommended for use in difficult places as well as in more conventional shaft applications, the units are contained in cartridges normally assembled into split pillow blocks. Two types of bearings are available: the fixed or grooved-race type for use as shaft locating and radial-thrust bearings; and the expansion or floating type for accommodating end play and shaft expansion. Constructed in various sizes for shafts ranging in diameter from $1\frac{11}{16}$ to 12 inches, the units are made in three series for medium, heavy, and extra-heavy duty applications.

Major advantage claimed for use of the split roller bearings is that maintenance requirements are limited to protection of the race surfaces by lubrication.

Noise Detector

A MAINTENANCE, testing, and inspection instrument for finding noise by both audient and visual methods in all types

(*Continued on page 269*)

Elec-Detec Model V Noise Detector

CONSTANT

..... laboratory testing

maintains Pelletex superiority as the SRF standard of the entire carbon black industry. Hundreds of tests are made daily in Cabot laboratories to assure uniformly excellent performance in all types of SRF rubber compounds. Resilience, abrasion resistance, state of cure, aging . . . these are but a few of the tests made regularly in a laboratory program which guarantees highest product quality.

Here a Cabot chemist demonstrates use of the National Bureau of Standards Strain Tester to determine tensile, modulus and elongation values of Pelletex-compounded rubber stock.

GENERAL ATLAS DIVISION of Cabot Carbon Co.
GODFREY L. CABOT, INC., 77 Franklin St., Boston 10, Mass

CABOT

PELLETEX

everybody talks

QUALITY

these pure light red iron oxides

by WILLIAMS assure it!

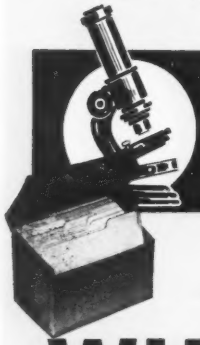
R-1599 | R-2199 | R-2899

They represent the ultimate in red iron oxide colors for the rubber industry.

Williams iron oxides come to you with all the benefits of our 75 years in the pigment business . . . and as a result of our experience in producing pure red iron oxides to specifications of the leading rubber companies.

Each is manufactured to rigid specifications for copper and manganese content, pH value, soluble salts, fineness, color, tint and strength by controlled processes and with special equipment. *The result is absolute uniformity of product.*

If you haven't already done so, try these finest of all iron oxide colors. Your own tests will show there is no equal for Williams experience.



LET WILLIAMS PUT THE MICROSCOPE ON *Your* COLOR PROBLEM

Whatever your color problem, bring it to Williams. Our 75-year experience can often save you time, money, and headaches in proper color formulation.

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New Materials

Silastic Molding Stock and Paste

TWO new silicone rubber products, Silastic 675 molding stock and Silastic 132 cloth coating paste, have been introduced by Dow Corning Corp., Midland, Mich. The molding compound, said to be serviceable from —100 to 500° F., is reported to show the lowest compression set of any extreme temperature silicone rubber and to have less than 3% shrinkage from molding and curing processes. Silastic 675 has a dielectric strength of 550 volts per mil, is resistant to the effects of moisture and water, and has the following properties:

		Cured at 480°F.	
	As Molded	6 Hrs.	12 Hrs.
Durometer, Shore A	52	70	72
Tensile strength, psi.	900	750	675
Elongation, %	380	275	200
Compression set (22 hours @ 300° F.), %	—	25	20
Linear shrinkage, %	1.8	2.2	2.6

Silastic 132 coats cloth and tape to produce excellent dielectric properties and good abrasion resistance, it is also claimed. Easily applied in a one-pass coating operation, the paste shows a scrape hardness (Hoffman scratch hardness tester) of 300 when coated on to fabric. A dielectric strength of 1,100 volts per mil was obtained for heat treated glass cloth coated to a 10-mil thickness; no loss in this strength was recorded after nine days' exposure to 480° F. heat.

Ink for Dark Surfaces

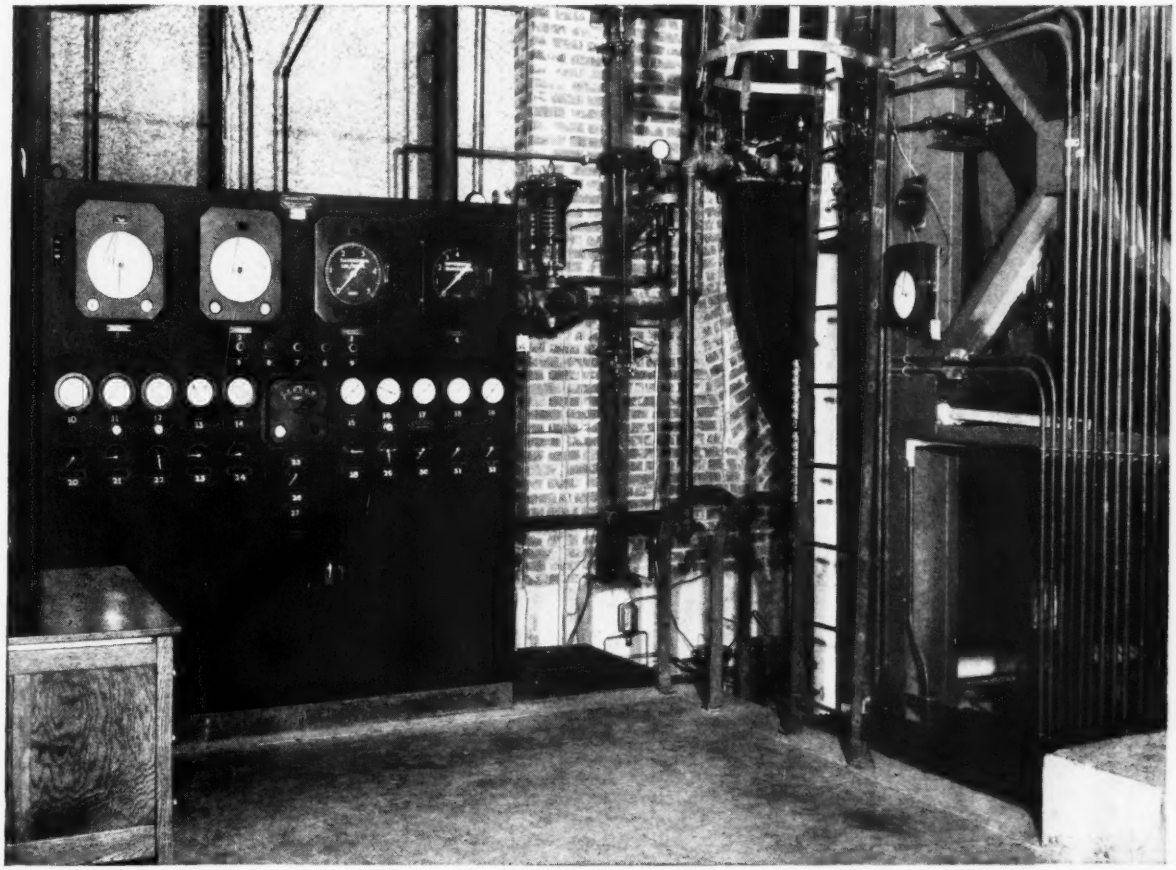
A NEW silver ink, No. 3-P-0972, reported to have exceptional brightness and opacity, has been introduced by Adolph Gottscho, Inc., Hillside 5, N. J., for use with the company's various printing and imprinting machines. The material was designed in an attempt to obtain greater contrast, when printed on black and other dark materials, and is said to have been used successfully on slab and sponge rubber, rubber-impregnated fabrics, and plastic sheet material.

Colloidal Graphite in Glycol

THE development and marketing of colloidal graphite dispersed in 1,3-butylene glycol has been announced by Acheson Colloids Co., division of Acheson Industries, Inc., Port Huron, Mich. The new product, known as Glydag B, is intended to be a source of colloidal graphite in rubber-lubricant formulations, largest use for which is the automobile industry. In this capacity the lubricant is employed to eliminate squeals between the rubber and metal friction surfaces of tight-fitting rubber bushings.

High Mileage!
SEE PAGE 140

How to cure a FLYING GAS TANK



Goodyear of Akron, Ohio, has found the answer. It uses a giant 45 ft. long by 15 ft. diameter Adamson heater, automatically controlled from start to finish of the cure by Taylor instruments. This mammoth vulcanizer, used for curing self-sealing gas tanks for aircraft, also large rubber life rafts, is operated by pushing a button. Goodyear is confident of uniform results, safe operation.

HERE'S HOW IT WORKS:

1. Push button closes door, locks it, turns on signal light.

2. Taylor FLEX-O-TIMER* Time Cycle Controller admits air to the FULSCOPE* Recording Temperature Controller, shuts the drain valves, applies air to seat door gasket. Then timer stops.

3. As temperatures reach control point, the timer again starts to accurately regulate the cure period.

4. At end of cure, it turns air off controllers, shuts steam valves, turns on cooling water valve, opens vent and drain valves.

5. At end of cycle, water valve shuts, timer stops. Only when pressure in heater reaches zero can door be opened.

This is another example of how Taylor is solving unusual control problems in the rubber industry as well as providing consistently accurate instrumentation for more conventional processes. Whether your problem is giant or midget, your Taylor Field Engineer will be glad to discuss it with you. Or write Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.

Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.

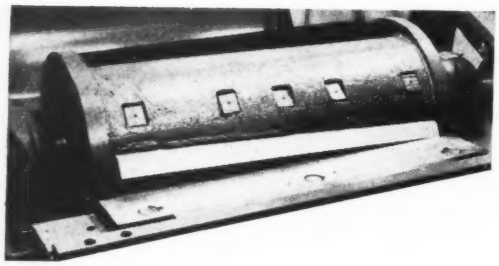
*Reg. U.S. Pat. Off.

TAYLOR INSTRUMENTS MEAN ACCURACY FIRST

VERSATILE CUTTERS

FOR THE DIVERSIFIED CUTTING PURPOSES OF THE–

RUBBER INDUSTRY



TAYLOR, STILES CUTTERS

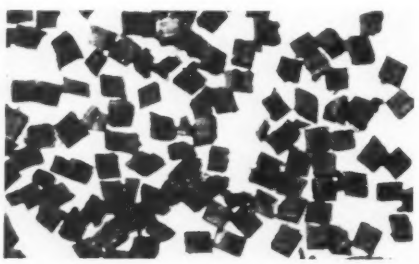
are key machines in the plants of important units of the rubber industry.

This is because they do a better cutting job. They can be applied in many necessary ways with only slight adjustments for individual requirements.

These machines employ a shearing principle to cut rubber of all kinds. They cut blanks from extruded stock to tolerances of ¼ oz. prior to molding. They cut huge truck tires into scrap for reclaiming. They cut rubber stock into strips and dice it for molding and extruding. Often we supply these cutters merely to specifications and do not know their precise applications.

•

Come to us with your particular rubber cutting problem and let us show you how to cut it efficiently.



TAYLOR, STILES & COMPANY

16 Bridge Street **Riegelsville, N. J.**

Non-Blooming Printing Compounds

A SERIES of unvulcanized crude rubber printing compounds, in which the use of free sulfur is eliminated by means of special ingredients in the compounds, has been developed by The B. F. Goodrich Co., Akron, O. Elimination of sulfur bloom, increased plate life, and reduction in the curing time by as much as 30% are the improvements expected to result from use of the new material. The compounds were primarily designed for use in Flexographic printing, but they can also be used for other letterpress applications.

Available with a hardness rating of from 35 to 65 durometer, the group of printing compounds is claimed to produce printing plates having high resiliency, easy molding, and safe storage properties, the latter characteristic present at both room temperature and under refrigeration.

Rubber Molding Resin 2088

THE Thermoid Chemical Co., Trenton, N. J., has developed a molding resin which is said to incorporate rapidly and aid in the dispersion of dry pigments in batches. Designated MR-2088, the material is reported to allow good mold flow and fill-out without smearing or marbleizing, and use of it in rubber tile flooring mixes is claimed to result in a hard, non-tacky surface for the tile even at elevated room temperatures.

Sold in chunks contained in fiber drums, the friable resin is said to be non-staining and highly resistant to discoloration by ultraviolet light. Other properties include: light-amber color; odorless; non-toxic; specific gravity, 1.04; melting range, 176-185° F.; and soluble in all rubber solvents.

CD Mold Release B-2

A COMPANION compound to the recently announced CD Mold Release B[1] has been developed by Chemical Development Corp., Danvers, Mass. Designated Mold Release B-2, this new product is intended for use with polyester, epoxy, and other plastics formed in porous or semi-porous molds.

Supplied as a paste, the material can be applied to the mold surface with a cloth or brush. The properties of high heat resistance, quick drying, high flash point, and insolubility in resins are claimed for it. An extended development and test period in which the release compound was reportedly employed successfully in the manufacture of polyester boat hulls preceded the present general availability of the material.

[1] India RUBBER WORLD, Sept., 1953, p. 782.

Emulsion Tackifiers

TWO new resin emulsion tackifiers, Arcco 25 and 26, have been announced by American Resinous Chemicals Corp., Peabody, Mass., for use in natural, neoprene, and GR-S latex adhesive formulations. The new materials are said to permit the development of fast breaking (fast setting) emulsion adhesives without the loss of emulsion stability. Arcco 25 produces low-viscosity, high-strength adhesive bonds. Arcco 26 produces low-viscosity, moderate-strength bonds, but develops greater tack than do adhesives formulated with Arcco 25.

Both tackifiers are colorless emulsions containing 42.5% total solids. They have a pH of 10, weigh 8.5 pounds per gallon, and are thinned with water. These tackifiers are used in the proportion of 60 parts to 40 parts of natural latex, but higher or lower proportions may be employed to modify the tack and quick-setting properties.

"Polyurethanes and Their Use as Adhesives." Technical Bulletin No. P-151. Monsanto Chemical Co., St. Louis 4, Mo. 16 pages. Information on use of these compounds for bonding rigid materials (metal-to-metal, glass-to-glass) is given. Included are data on preparation, curing, use, tensile strength of bonds, open cure conditions, etc.

"Lauxein Protein Adhesives." Monsanto, Springfield, Mass. 24 pages. These adhesives, which include casein, soybean, and casein-soybean blends, for woodworking, plastic laminating, and prefabricated home industries are described in this illustrated booklet. Also covered is the company's No-Clamp gluing process.

NEVILLE – the Name to Remember in RUBBER PROCESSING Resins and Oils

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MOLDED PRODUCTS

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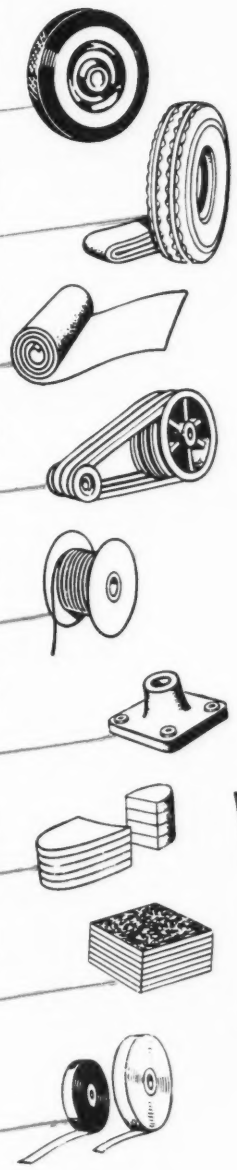
ADHESIVE TAPE



You will find Neville Coumarone Resins ideal extender-plasticizers, which will not tend to lower hardness, tensile, modulus or tear. They are available in various grades of melting points and colors.

Neville Resins and Oils are products of years of experience in meeting rubber processing problems. They save production time and costs, to say nothing of improving product quality.

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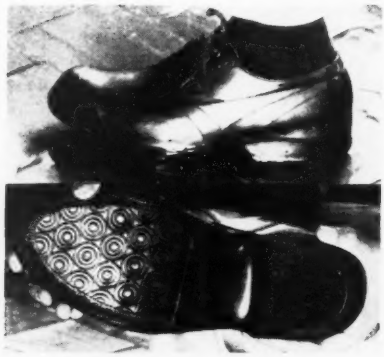
New Goods



Neoprene Safety Rubbers

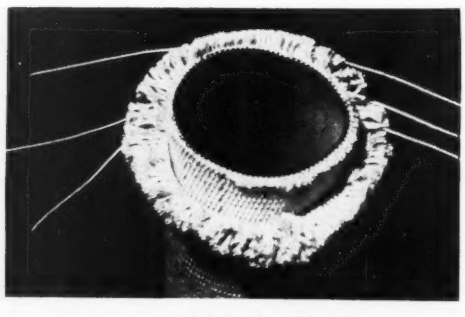
Neoprene Overshoes

WORKERS who must walk on floors soiled with grease, oil, acids, chemicals, solvents, and the like can now be protected from slipping and from deterioration of their shoes by use of overshoes molded of neoprene rubber. Constructed with small suction cups on the bottom and containing no fabric lining, Tri-Vac Safety Rubbers are made in three sizes of small, medium, and large by Tingley Rubber Corp., Rahway, N. J. The company also manufactures these Safety Rubbers from natural rubber for use on wet and icy pavements.

Firestone Racing Tire

A NEW racing tire, designed for salt flats and straight-away running, has been developed by Firestone Tire & Rubber Co., Akron, O. The product was used by Willie Young on his 600-hp., twin-engine vehicle which he drove recently at Bonneville, Utah, at a speed of 256.045 mph. to set a new speed record for the National Speed Trials.

The tire, claimed to be capable of withstanding the extreme heat generated at speeds over 300 mph., features low-tread contact area for minimum rolling resistance and vented treads to reduce tread weight. The inner tubes are constructed with heavy-base gage rubber and are equipped with reinforced metal stems threaded from the base. These stems are locked into position by a hex nut and insulated with leather washers.



Cut End of BWH Glass-Fiber Hose

Glass-Fiber Fire Hose

HIGH-STRENGTH glass-fiber yarn is being manufactured into fire hose weighing 20% less than conventional cotton hose, according to Boston Woven Hose & Rubber Co., Cambridge, Mass. Tests involving impacts from trucks of 10 tons or more are said to have proved the durability and strength of the hose. More compact coiling, elimination of water absorption by the fabric, increased bore diameter with same outside diameter, and reduction of crew size for handling are other advantages cited for this fire hose.

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Goodrich Power-Grip Tractor Tire

Goodrich's All-Nylon Silvertown Tire

Tractor Tire

A NEW Power-Grip rear wheel tractor tire designed especially for use on wet ground, with heavy implements, or on slick cover crops has been announced by The B. F. Goodrich Co., Akron, O. The prime feature of the unit is the cleats which are higher at the shoulder and longer than previous models and which are braced at the base to prevent bending and scrubbing on hard surfaces. Longer tire life and increased efficiency of the tractor are among the advantages expected to result from use of the product.

Traction Express Truck Tire

A new, all-nylon truck tire, called the Traction Express Silvertown, which is reported to have delivered more than 100,000 miles in many types of service has also been announced by the Goodrich company. Built with a tread said to be 46% thicker than the tread of regular tires, this product is claimed to give more original mileage than a regular tire and a recap combined.

The tire, specially designed for the drive wheels of trucks and tractors, features the tread which, in addition to giving increased wear, is claimed to be cooler running, resistant to abrasion, and designed with transverse cleats for quick, safe stops. Shock-shield construction consisting of layers of nylon cord placed beneath the tread rubber protect the tire body from road shock and damaging bruises, according to the manufacturer. The Traction Express Silvertown is available in sizes ranging from 8.25-20 10-ply to 11.00-22 12-ply.

Vinyl Adhesive for Dolls

A NEW vinyl adhesive for use in attaching vinyl and other fabrics to slush molded objects has been announced by Adhesive Products Corp., New York, N. Y. In particular, Vinyl-Grip is recommended for securing Saran and Mohair wigs to doll's heads. The compound is a solvent type transparent and waterproof material, and is available in two viscosities for manual application and for spraying.

Fitting for Gasoline Pump Hose

A RE-ATTACHABLE fitting for gasoline pump hose which is reported to increase the life of the hose by as much as ten times has been developed by Hewitt-Robins, Inc., Stamford, Conn., in cooperation with the International Coupling Co. Known as Dubl-Grip, the coupling is claimed to permit up to 200,000 flexing and twisting cycles of the hose to which it is attached (*versus* an average number of 20,000 for hose with other couplings).

The unit is constructed of brass with polished chrome and contains a hexagonal outer sleeve for ease of installation. It is available in sizes to fit hose having an internal diameter of ¾-inch and an outside diameter of 1⅛ inches.

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Calco MBTS scores high in low dusting!

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see reverse side

Nylon Motorcycle Tire

ANNOUNCED as available by the Goodyear Tire & Rubber Co., Akron, O., is an all-nylon cord tire for motorcycles, reported to be the first American-made nylon tire made for this type of vehicle. Known as the All-Nylon Super Eagle, the tire is made in one size, 5.00-16, and is priced slightly higher than conventional cycle tires. The advantages of safety and long wear are claimed for the product as a result of the lightness and flexing strength of the cord, and the use of a rugged, skid-resistant tread design.

Floor Aisle Runner

FRESTEP, a new low-cost plastic-surfaced sponge-rubber aisle runner, has been added to the line of flooring manufactured by Fremont Rubber Co., Fremont, O. In addition to ease of cleaning and added comfort, the new product is said to provide improved wear by virtue of the vinyl plastic covering. Expected to find wide use in offices, stores, industrial plants, and institutions, the runner is available in rolls 36 inches wide and 25 yards long and in four marbleized colors: dark green, brown, red, and gray.

Snow Tire by General Tire

A NEW Winter-Cleat tire to battle snowy roads and slippery streets has been announced on the fifteenth anniversary of the introduction of the first winter tire by The General Tire & Rubber Co., Akron, O. Reported to have been field tested in

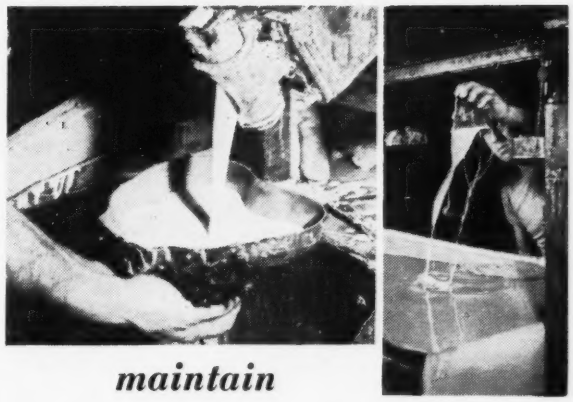
Vice President H. A. Bellows with General Tire's New Winter-Cleat Tire

the Rockies last year, the new product features an increase in the overall tread width by 20%; outside cleats in a staggered pattern; and a cleat height of as much as ½ inch. According to the company, these characteristics provide greater road stability and quieter running for the snow tire.

Truck Tire

THE United States Rubber Co., Rockefeller Center, New York 20, N. Y., has developed a new highway truck tire which reportedly gives up to 41% more original tread miles over previous types and which has variable grooves and ribs to give maximum stability and wear. Called the Fisk Transportation, the tire features "angle action" tread with more than 33,000 biting edges in the larger sizes; load molded contour so that the inflated shape of the tire is the same as when the tire leaves the mold; elimination of weather checking, aging, and surface deterioration of sidewalls through use of a new chemical, YLG; and a 50% stronger weld of cord to cord and ply to ply through use of an adhesive cord treatment involving infrared rays. The Fisk Transportation is available in all sizes ranging from 6:00-16 to 11.00-24.

PLASTISOL MOLDING?



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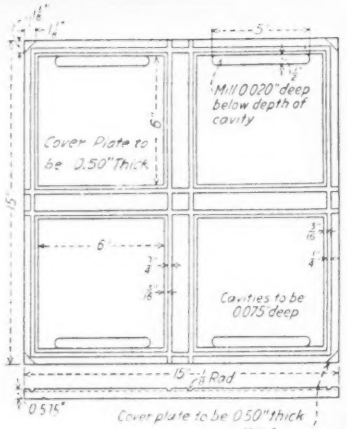
Mill 0.020" deep below depth of cavity
Cover Plate to be 0.50" Thick
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15/16 Rad
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FAR EAST

CEYLON

Plantations Data Released

According to latest statistics, the total area under rubber in Ceylon is at present 656,879 acres, of which only 116,155 are planted with clonal seedlings; the rest is under ordinary seedlings.

Slightly less than half the total area, or 315,330 acres, consists of holdings of less than 100 acres, and in this category there are 125,656 holdings of less than 10 acres each. The remaining 341,549 acres include 649 estates between 100 and 500 acres each, and 216 estates over 500 acres each. European estates account for 225,236 acres, or 34.3% of the whole, as compared with 228,456 acres, or 35% of the total, in 1951.

Total production of rubber in 1952 amounted to 96,500 tons, of which 80,000 tons came from estates, and the balance from smallholdings. The estate rubber included 42,655 tons sheet, 5,412 tons crepe, 12,928 tons scrap crepe, 17,677 tons latex crepe, and 1,328 tons latex.

In 1952, 89,432 tons of rubber were exported. The chief buyer was Red China, which took 29,691 tons; other important customers were the United States—16,815 tons; United Kingdom—15,099 tons; Italy—6,472 tons, and Germany—4,286 tons. The local industry used 222 tons of rubber, chiefly for retreading automobile tires, and for the manufacture of rubber toys, balloons, surgical gloves, and the like.

Rubber production in Ceylon may be expected to show some decline in the next five years or so, since the government has initiated a scheme calling for the subsidized replanting of 100,000 acres of uneconomic rubber at the rate of 20,000 acres a year for the next five years.

The government announcement that it would accept applications for replanting subsidies may have undesirable repercussions. Apparently large numbers of smallholders assumed that the mere filing of an application automatically assured them of a subsidy and in anticipation of the grant and as a preliminary to uprooting before replanting, immediately began slaughter-tapping their trees in earnest. It is said that about 10,000 acres, mostly smallholdings, are already involved. The press has been warning against this indiscriminate slaughter-tapping which may have disastrous consequences for those smallholders whose applications for a subsidy may have to be rejected—as many will—because of lack of planting material or funds, or because the land is unfit for replanting.

Increased Shipments to Red China Desired

Ceylon officials are to visit Peking soon to settle next year's prices of Ceylon rubber and China rice, in accordance with the five-year trade agreement which provides for annual revision of prices. It is understood that Ceylon would like to increase her shipments of sheet to China from the present 50,000 tons a year to 70,000 tons a year, provided the China Government agreed to pay more than the world market price.

During the first half of 1953, Ceylon has already sent Communist China 29,300 tons, well over half the amount of the contract. The fact that Ceylon stocks at the end of June showed a marked increase over those for preceding months suggests a reason for the government's anxiety to increase the contract. But what the Chinese would be prepared to pay for the extra rubber is another question. In this regard, recent Chinese complaints about the quality of Ceylon rubber shipments may be a straw in the wind. That the complaints are at least to some extent justified is proved by the fact that the Ceylon authorities have become stricter with dealers and shippers over grading, and standards have been raised. Thus substantial quantities of sheet formerly offered and accepted as RSS Nos. 1 and 2 have been reclassified as Nos. 2 and 3.

Besides trying to sell more rubber to the Chinese at their price, the Ceylon delegates will also have to persuade the Chinese to accept a lower price for next year's rice supplies. A spokesman for the Ceylon Government declared that there were indications that the world price of rice would touch its lowest postwar level, and that the Burmese Government had already warned rice producers of this trend, so that the request of the Ceylonese would be reasonable. Of course the Chinese could use a similar argument in dickering over rubber prices.

Incidentally, the situation on rice supplies in Ceylon seems complicated. An announcement in July by the Minister of Food

& Agriculture states that the price of rationed rice would be increased from 25 rupee cents to 70 rupee cents a measure (two pounds) as from July 20, but that the rice ration was to be increased. The new price will be subsidized to the extent of 12 cents a measure. However, it will cause a rise of about five points in the cost of living index, and add 1.85 cents per pound to the cost of rubber production.

Rubber Industry Notes

Whether it is because rubber growers here have become indifferent about crepe since they can sell sheet to the Chinese at a high price, or for some other reason, the quality of Ceylon crepe has deteriorated. Recently one of the most important rubber buyers in Britain had occasion to warn Ceylon that if the quality of shipments was not improved, she would forfeit to Malaya the greater part of the British market for crepe rubber. At present Ceylon crepe is cheaper than that from Malaya, but the latter will soon become competitive, it was added.

A London firm of rubber brokers suggests that the reason why Soviet authorities have been absent from the London rubber market in recent months may be that some of the rubber supplied by Ceylon to China is entering Russia.

Negotiations are under way between the Ceylon Government and a British shipping line providing for British ships to carry all Ceylon exports to China except rubber. The Chinese have all along insisted that rubber be transported in Polish or Russian vessels, but they would agree to British ships taking all other cargo for them; in this way more space would become available on Polish ships.

A representative of Bridgestone Tire Co., Japan, has been investigating possibilities for a tire factory in Ceylon. The Japanese firm seems to have in mind an enterprise in which Ceylonese would hold 51% of the shares, and Japanese the remaining 49%. Ceylon imported 279,967 pneumatic tires and 229,800 tubes last year from the United States, United Kingdom, and India.

MALAYA

American Mission Expected

Malayan tin and rubber producers have been looking forwar to the visit of the American Congressional Mission, which is making an orientation tour of southeast Asia and was scheduled to arrive in Malaya on October 8. The members of the mission included: Leroy Johnson, James Patrick Sinnott Devereux, and William Gilmer Gray (Republicans), and O. Clark Fisher, Victor Wickersham, and William Arthur Winstead (Democrats).

Malayan producers hope to be able to explain their problems and that a better understanding between them and American buyers will result.

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. . . are sodium polyacrylate thickeners available as high (296BT) and medium (296N) viscosity grades. They are water soluble anionic colloids furnished as straw-colored, homogeneous solutions containing 15% solids.

POLYCOS 296BT and 296N

. . . are recommended as stabilizers, protective colloids and thickeners for natural, synthetic, rubber and resin latices. They are particularly noted for their exceptionally high thickening action on most types of natural and synthetic latices. Their unique adhesive, suspending, emulsifying and film-forming characteristics, make them adaptable to many industrial uses.

Alone, Polycos 296BT and 296N produce clear, slightly yellow, films. These acrylic thickeners are fully saturated compounds and deposited films will not oxidize or embrittle with age; they will not alter color values of pigments or dyes.

For complete information and data, write for Bulletin P-27.

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MAGLITE-M*
A top curing aid • Has better acid acceptance, anti-scorch properties, uncured stock life • Safer tubing at higher die temperatures • Faster tubing and wire covering • Better molding characteristics.

MAGLITE-D*
All the advantages of MAGLITE-M and with these added values.
Easier incorporation into neoprene • Greater bulking factor per cubic foot • Higher magnesium content.
*Products of the Marine Magnesium Division of Merck & Co.

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Remilled Rubber Output Down

Recent statistics issued by the Secretariat of the International Rubber Study Group give the total production of remilled rubber in the Federation of Malaya and Singapore over the first half of 1953 as 67,856 long tons, against 78,238 long tons in the first half of 1952. The month-to-month totals show that while the figure for January, 1953, corresponded to the average monthly production in the 1952 period, there was a steep reduction in February, which was not fully restored in the succeeding four months.

The importance of Singapore as a producer of remilled rubber, particularly of thick crepe, is shown in the following table (in tons):

	Federation	Singapore	Total
Thin remilled crepe	13,300	5,079	18,379
Thick remilled crepe	4,983	34,666	39,649
Thin light brown crepe	6,426	—	6,426
Flat bark crepe	1,818	1,584	3,402
Total	26,527	41,329	67,856

Production of special rubber during January-June, 1953, totaled 3,374 long tons, made up of 212 tons of softened rubber, including rubber containing peptizers, and 3,162 tons of non-standard grades prepared according to patented or technically specified procedure. Apparently no chemically modified rubber was made during the six-month period.

Concern over Exports of High-Yielding Material

Malayan estates have for some years now been exporting rubber seeds and budgrafts under permit obtained from the Rubber Controller. Until recently such shipments do not seem to have attracted any special attention since they were made to fill commercial orders, and the exporting estates had no investment in the enterprises abroad. Lately, however, the large shipments of clonal seeds to develop plantations in Nigeria, in which Malayan companies hold the majority of shares, have called forth some more or less acrid comment, particularly on the part of certain local politicians, who apparently see a potential danger to Malaya both politically and economically, in the development of rubber plantations in other British colonies, with the aid of Malayan material. These men point out that such enterprises may attract British investors away from Malaya and lead to the establishment of a competitive rubber industry before Malaya has been given her independence, with the results that not only will her position as the leading rubber producer be undermined, but that her independence may be delayed. It has been suggested that the matter may develop into a political issue.

The Nigerian project referred to is the Oban (Nigeria) Rubber Estates, Ltd., of whose share capital of £800,000, three Malayan companies hold 51%, while the remaining 49% is held by the local Regional Production Development Board. The Malayan companies are Kepong (Malaya) Rubber Estates, Ltd., which holds three-fifths of the 51%, and the Kuala Muda Rubber Estates, Ltd., and Gordon (Malaya) Rubber Estates, Ltd., which each have one-fifth.

The Oban company has acquired 12,500 acres, which are to be cleared and planted with the high-yielding material from Malaya, under the supervision of General Manager F. M. Riley, until recently manager of the Eldred Estate of Broome Plantations, of Johore. Mr. Riley will also have to see to the training of labor with no previous experience of rubber estate work, and the building of 200 miles of road and two bridges. Under his direction 2,000 acres of jungle have already been cleared for the setting out of 900,000 Malayan clonal seeds, from which it is expected to obtain enough trees with a potential yield of more than 1,000 pounds per acre, to plant up 8,000 acres.

Already the Lanchang Estate (in the State of Pahang, Malaya) of Chermang Development, Ltd., has obtained a permit for the export by air of 400,000 clonal seeds to Nigeria. Another Malayan estate is said also to be considering a Nigerian order for an equal number of seeds, but it does not yet appear to have requested a permit.

Malayan Producers, Ltd., Tanjong Rambutan, has been authorized to export 40,000 seeds to Nigeria.

Rubber Industry Notes

Cyclized rubber is being produced on a small scale in pilot plants by H & C Latex, Ltd., and the Rubber Research Institute, Kuala Lumpur, and experimental consignments of from one ton to five tons monthly are being sent abroad. According to a

spokesman for the British Rubber Development Board in Kuala Lumpur, several footwear manufacturers in the United States and the United Kingdom, who have received samples of the rubber, intended for soling, have been "enthusiastic" over the product. No attempt, however, is to be made to manufacture cyclized rubber on a truly commercial scale here until there are more indications of its potentialities and value.

Penang has just witnessed the loading of the first direct shipment of bulk latex on an ocean-going freighter in its harbor. On September 10, about 480 tons of liquid latex, transported from Kedah to Penang in two lighters, were pumped into the tanks of *Steel Age*, a freighter of Isthmian Co. The latex came from the new bulking plant of the Malayan-American Plantations Co. and was handled by the Malayan Stevedoring & Transportation Co. It is understood that the two concerns are to perfect methods of handling and conveying bulk latex for overseas shipment.

With the average price of rubber during July at 65.15 Straits cents per pound, and 64.35 cents in August, the price levels during September are being closely watched by both employers and workers, for if the average continues under 65 cents, a new wage agreement will have to be made for Malaya's 320,000 rubber estate workers. A temporary wage rate would have to be fixed by the Minister for Social & Industrial Relations until the new wage scale was agreed upon, which would go into effect on November 1.

INDIA

To Increase Motor Transportation

The Tariff Commission of the Government of India recently submitted its report following an inquiry on the measures to be adopted to develop the automobile industry in India. To stimulate the very small demand for cars in India, which is the chief obstacle to speedy development of an automobile industry here, the Commission suggested a reduction in the existing high import duties on component parts which have hitherto contributed to pricing the cars beyond the reach of many a potential buyer. A kind of five-year manufacturing plan for five specifically named assemblers of automobiles was outlinel, and the development of related industries and the establishment of an Automobile Development Council were recommended.

The government was in general agreement with most of the recommendations and has already announced reductions in import duties on component parts of automotive vehicles, including various rubber parts, effective May 31, 1953. It has also decided to set up a committee to examine taxation of road transport so as to improve the taxation system and thereby aid the development of automobile transport.

The local rubber industry is naturally very much interested in all this. Already various rubber accessories of good quality, including tires and tubes, are being produced here, and assembly plants have been using them in increasing quantities; the possibility of being able to supply still more goods to a local automobile industry is thus welcomed. That there is need of measures to stimulate motorization here is proved by the fact that in India there is on an average only one car for every 1,360 inhabitants.

Developments in the Past Year

Developments in the home rubber industry during the year ended March 31, 1953, were reviewed in the annual report of the Indian Rubber Industries Association as well as in an address by its president, which was read before the general meeting in Bombay, May 28.

Stocks of domestic raw rubber were ample during the year; output rose from 17,148 tons in 1951 to 19,863 tons in 1953. But the government controlled price for RMA 1, which was fixed at 138 rupees per 100 pounds on October 28, 1952, and is to be maintained for three years from that date, is substantially higher than the Singapore price.

During December 24-27, 1952, a conference of rubber manufacturers and an exhibition of rubber goods manufactured in India—the first of its kind—took place in Calcutta, and the exhibition especially was pronounced highly successful. Among the problems discussed at the conference was the possibility of setting up an alkali reclaim rubber plant in India. The local tire industry consumes 12,000 to 14,000 tons of raw rubber annually, and it is hoped the government will give the necessary support to a scheme for a fair-size plant with initial annual production capacity of 2,000 tons.

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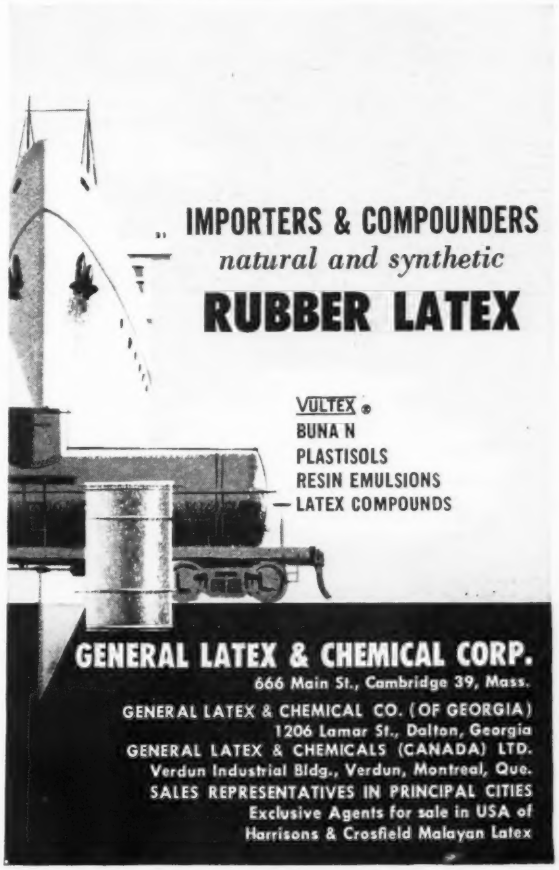
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Another plan decided on at this conference was the formation of an Export Sales Organization which would aim at developing export markets for Indian rubber goods by handling exports on a collective basis.

Steps toward establishing a Rubber Research Association in cooperation with the Indian Rubber Industries Association and the Association of Rubber Manufacturers in India have so far failed of their goal. On the other hand some progress in drafting standards for locally produced rubber goods was made during the year by the Indian Standards Institution.

It is understood that a Committee of Experts has been appointed by the Director of the Indian Institute of Technology to advise in connection with the necessity of starting a post-graduate course in rubber technology at the Kharagpur Institute.

In the recent trade agreement between India and Turkey, automobile tires and tubes (except giant-size tires and tubes) and surgical rubber goods figure among the main exports from India.

Nanco Rubber & Plastics, Ltd., Coimbatore, South India, has obtained a license from the Government of India to manufacture tennis balls. Apparently these will be the first tennis balls to be manufactured locally.

INDONESIA

Conditions in Indonesia seem more confused and uncertain than ever. In the beginning of September press reports stated that smallholders and even many estates were suffering as a result of the low prices, with cost of production in some cases above prevailing rubber quotations, and the Bank of Indonesia was stated to have revealed that many estates were working on the border line. The Indonesian Government, according to these sources, had ordered discussions between estate managers and labor organizations, with the purpose of intensifying the labor effort, which is now well below prewar level, and also of maintaining present wage scales.

Barely a week later came reports that 700,000 estate workers throughout Indonesia were on strike for wages higher than granted them by a recent decision of the Government Arbitration Commission for labor disputes. The Labor Minister then declared the strike illegal since it was against the decision of the Government's Arbitration Board, and matters were placed in the hands of the Attorney General so that strike leaders could be arrested, it was understood. However not only were no arrests reported, but the government in a few days relaxed its attitude to the extent of seeking a compromise with labor leaders—apparently influenced in this by the fact that it depends, to some extent at least, on Communist support.

Earlier in the month an English-language newspaper, *Times of Indonesia*, was reported to be agitating in favor of rubber sales to Communist countries as the only alternative to "economic hara-kiri."

AUSTRALIA

Polystyrene molding materials are to be produced in Australia for the first time, it is reported. The Melbourne plant of Monsanto Chemicals (Aust.), Ltd., with a capacity of 3,000 tons a year, is expected to be operating very soon. At first imported monomer will be used, but plans have been made providing for early local production of monomer material.

In 12-18 months Monsanto's example is expected to be followed by CSR Chemicals, Ltd., a subsidiary of Colonial Sugar Refining Co., Ltd., in association with Distillers Co., Ltd., of Scotland.

BRAZIL

The eleventh Brazilian Chemical Conference, scheduled for Sao Paulo during the week of July 4-10, 1954, will include eight scientific sections: (1) general chemical, inorganic and physical chemistry; (2) analytical chemistry; (3) organic and biological chemistry; (4) bromation, toxicological and legal chemistry; (5) agricultural chemistry; (6) industrial and engineering chemistry; (7) history and education; (8) organization and economy.

Since 1954 also happens to be the year in which the four hundredth anniversary of the founding of Sao Paulo will be celebrated, there will be other congresses as well as exhibitions and various festivities to attract the visitor to the city.

EUROPE

SPAIN

At the twenty-first International Samples Fair in Barcelona, June 1-20, the various branches of the Spanish plastics industry were again represented in a special pavilion. This is the second time that the Spanish plastics industry has arranged its own exhibition, and the venture was highly successful. Not a single local firm of any importance failed to show its products, and the varied and colorful displays came as a surprise to those visitors—nationals as well as foreigners—who were unaware of the considerable advances in the manufacture of plastics goods in Spain in the last few years.

All kinds of extrusions, injection-molded parts, calendered sheet, laminated products, artificial leather, coated and decorated sheeting, cable insulations (mostly of PVC) were shown, besides drug sundries including ultramide nipples and pacifiers, tubing and bottles of polythene, toys, and goods for the home. Several of these items were produced under foreign license.

Except for the phenolics, home production of which covers demand, the greater part of the basic materials must be imported, and a number of foreign manufacturers of these basic products were represented either through their local agents, or directly, including American, British, and German firms, besides a Dutch and a Swiss firm.

The recently formed Centro Espanol de Plasticos (Spanish Plastics Center) also had a stand in the Plastics Pavilion. This new organization, established to improve and advance the home industry, is to work closely with the Department of Plastics of the Juan de la Cierva Foundation for Technical Research, and it will also seek to contact and cooperate with similar institutes, research centers, publications, etc., in Spain and in all other countries.

Revista de Plasticos, published by the de la Cierva Foundation, will also serve as the organ for the new Centro Espanol de Plasticos.

NETHERLANDS

Reconstruction of the Heveadorp works of the N. V. Vereenigde Nederlandsche Rubberfabrieken, one of the largest rubber goods factories in Holland, has now been completed. During the war, in 1944 and 1945, the works had been about 80% destroyed and in the reconstruction were modernized and expanded. The rehabilitated works will continue, as before, to produce covers and tubes for bicycles and other means of transport, rubber goods for industrial and household purposes, and rubber footwear. The company also has a factory at Raalte, built after the war especially for the manufacture of linen shoes and slippers with sponge rubber soles. Altogether 1,800 persons are employed by the firm.

The new factory for automobile tires being built in Amsterdam for The General Tire & Rubber Co., Akron, O., U. S. A., is to start production in April, 1954, with an initial output of 100,000 tires a year, it is learned. About 200 workers will be employed, and raw materials to a value of roughly $2,000,000 to $2,500,000 will be processed annually.

Noise Detector

(*Continued from page 252*)

of mechanical equipment has been announced by Anco Instrument Division, American Name Plate & Mfg. Co., Chicago, Ill. Designed as a portable unit, Elec-Detec Model V is an electronic device by whose use standards can be set up for proper operation of machines.

The instrument consists of a highly stable germanium crystal diode and a milliammeter for visual operation, and three batteries, an amplifier, and headphones for audible operation. The sound is picked up by means of a probe and transmitted by electric impulses to the crystal and to the amplifier. Frequency response of sound ranging in magnitude from 100-8,000 cycles per second (with accuracy within three decibels) is claimed for the audio-video instrument.

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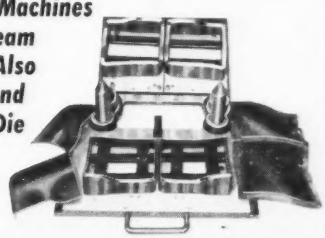

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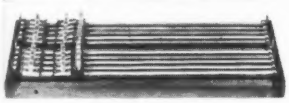

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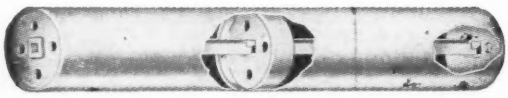

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Editor's Book Table

BOOK REVIEWS

"Cellulose, The Chemical that Grows." William Haynes. Doubleday & Co., Inc., Garden City, N. Y. Cloth, 5½ by 8½ inches, 386 pages. Price, $4.

This book presents an interesting and eminently readable history of cellulose technology from its recorded beginnings up to the present day. A tale of chance, luck, and the perseverance of a gifted few, the story describes the complex qualities of this useful chemical and its conversion into such modern-day products as plastics, lacquers, cellophane, rayon, explosives, and others. The difficulties encountered by the pioneer workers and tracing the growth of each cellulose-based industry make for a fascinating account that is non-technical, yet factual. Many photographs of products and processes are used to illustrate the text, and there are also a glossary of terms, tables of technical and statistical data, and a subject index.

"Chemical Process Machinery." Second Edition. Emil Raymond Riegel. Reinhold Publishing Corp., 330 W. 42nd St., New York 36, N. Y. Cloth, 6 by 9 inches, 742 pages. Price, $12.50.

This revised and greatly expanded edition of Riegel's highly regarded book presents up-to-date information on equipment used in the chemical and process industries in terms understandable to engineers, students, and laymen. Covering only equipment available commercially, this edition embraces the latest developments in machinery; has new material on distillation, mixing, and instrumentation; gives enlarged descriptions of evaporators, dryers, heaters, coolers, pumps, and other machinery; and has eliminated material on equipment which is now obsolete.

As in the first edition, classification of equipment is by function, and the chapters deal with plant site selection; size reduction, screening and grading; conveying and elevating; tanks and containers; pumps; weighing and proportioning; gas propulsion; gas cleaning; mixing; separators; evaporators; crystallizers; dryers; distillation; vacuum equipment; heat exchangers; heaters and coolers; gas conditioning; hydraulic equipment; high-pressure equipment; and instrumentation. An appendix of reference data and a comprehensive subject index are also included in the book.

"Textile Fibers, Yarns, and Fabrics." Ernest R. Kaswell. Reinhold Publishing Corp., 330 W. 42nd St., New York 36, N. Y. Cloth, 6 by 9 inches, 568 pages. Price, $11.

Intended for scientific or technical personnel who do not have a fluent knowledge of the field, this book is an annotated and interpretive bibliography presenting a comparative study of the behavior of textile fibers, yarns, and fabrics, with special reference to wool. The research results of some 400 investigators are given and discussed by the author to present a comprehensive picture of current information on these textile materials, including all the well-known synthetic fibers.

The text is divided into two sections, the first of which, comprising nine chapters, covers inherent properties such as tensile stress and strain, friction, moisture absorption, thermal properties, stability, microbiological properties, and dyeing characteristics. The 13 chapters comprising the second section deal with textile properties that depend on inherent fiber characteristics and fabric geometry and cover such topics as resilience, permeability, crease resistance, wear resistance, soiling and laundering, and fabric drape, hand, and luster. A bibliography, author index, and subject index conclude the book.

NEW PUBLICATIONS

"Diamond Precipitated Calcium Carbonates for the Rubber Industry." Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland 14, O. 34 pages. This well-ordered brochure presents typical chemical analyses, physical properties, features, and applications of six standard grades of the company's fillers. A series of graphs and charts provides physical property data on stocks compounded with these carbonates, including the basic recipe, maximum tensile strength, maximum tear resistance, and percentage of elongation at six loadings ranging from 25-150 parts pigment at a press cure as 287° F.

"Barco Swivel Joints for Piping." Catalog No. 265-A. Barco Mfg. Co., 501 Hough St., Barrington, Ill. 12 pages. The self-alining swivel joints of ball and socket construction manufactured by the company are described with specifications, drawing, and pictures.

"Effect of Carbon Black on Water Absorption of Neoprene and Buna N Compounds." R. P. Rossman, H. J. Collyer, T. C. Bolt. Technical Service Laboratory Bulletin No. GD-5. Godfrey L. Cabot, Inc., 77 Franklin St., Boston, Mass. 3 pages. The salt contents of Cabot blacks were studied in this capacity; results are given, and conclusions are drawn from the data.

"Symposium on Plastics Testing—Present and Future." Special Technical Publication No. 132. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Paper, $2.00. 74 pages. The papers presented by members of ASTM Committee D-20 on Plastics at the fifty-fifth annual meeting of the Society in New York in June, 1952, are here assembled. They include, in addition to the introduction, the following: "The Measurement and Significance of the Mechanical Strength Properties of Plastics"; "Measurement of the Effect of Temperature on Some Physical Properties of Plastics"; "Measurement of Color, Gloss and Haze"; "The Effects of Molding Conditions upon the Permanence of Plastics"; and "Residual Stresses in Phenolic Plastics."

"Installation of Seamlex Rotarys." Bulletin No. 5080. Seamlex Co., Inc., Long Island City, N. Y. 2 pages. The correct methods of installing rotary pressure joints for steam are described and illustrated.

"Rubber Chemicals: C-P-B Z-B-X, D-B-A—Low Temperature Accelerators." Compounding Research Report No. 25. Naugatuck Chemical Division of United States Rubber Co., Naugatuck, Conn. 8 pages. The physical properties of these compounds, a discussion of their use in low-temperature vulcanization processes, and recommended amounts of each to be used in the manufacture of different types of stocks are contained.

"Republic Wiretex Rubber Covered Hydraulic Hose Selector." Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown 1, O. The Selector is a sliding chart arrangement intended to facilitate the proper selection of hose from a knowledge of factors such as minimum burst strength, working pressure required, inside diameter, etc.

"Accident Rates in the Rubber Industry, 1952." National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill. 12 pages. This booklet contains the 1952 accident experience of all companies that report to the NSC. Worthy of mention are the following outstanding safety records: world record in chemicals—E. I. du Pont de Nemours & Co., Inc., rayon plant, 28,160,000 injury-free manhours; tires and tubes—Firestone Tire & Rubber Co., 6,542,463 injury-free manhours; footwear—Dominion Rubber Co., Ltd., 6,411,303 manhours; industrial rubber goods—United States Rubber Co., 5,688,369 manhours; and rubber reclaiming—U. S. Rubber Reclaiming Co., 4,271,657 manhours.

"Hydroperoxide Decomposition in Relation to the Initiation of Radical Chain Reactions." L. Bateman, H. Hughes, A. L. Morris. Publication No. 180. The British Rubber Producers' Research Association, Welwyn Garden City, Herts, England. 16 pages. Two aspects of the catalysts of liquid phase olefinic autoxidations are discussed: hydroperoxide catalysis; and the relation between the kinetic form of the initiating process and the mechanism of hydroperoxide decomposition.

"Rubber Tubing Wall Chart." Arthur S. La Pine & Co., Chicago, Ill. 1 page. Designed for reference in storerooms and laboratories, this 8½- by 11-inch chart contains illustrations, dimensions, physical properties, and prices of 18 types of tubing.

"Darex High Styrene Copolymers." Bulletins C-11, -12, and -13. Dewey & Almy Chemical Co., Cambridge, Mass. 1 page each. The compounding of Darex 43G with various quality GR-S 1001 sole stocks, with GR-S X-745 oil masterbatch polymer, and with GR-S 1502 cold polymer are described in these respective publications in regard to stock composition and physical properties.

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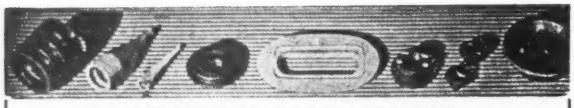

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"Foxboro Dial Thermometers." Bulletin No. 467. The Foxboro Co., Foxboro, Mass. 16 pages. Complete data on temperature indicators of the vapor pressure and gas pressure types, as well as temperature ranges, available accessories, and construction details for these instruments are covered.

"Pigments." Columbia-Southern Chemical Corp., 1 Gateway Center, Pittsburgh 22, Pa. 40 pages. This handsome ring binder contains pigment data bulletins, indexed according to product designation, on the properties of the various grades of non-black pigments manufactured by Columbia-Southern.

"Union Steam Generators and Allied Equipment." Catalog No. G.B.-153. Union Iron Works, Erie, Pa. 20 pages. Described and illustrated in this brochure are two-, three-, and four-drum steam generators; heat recovery units; Dowtherm vaporizers; reaction kettles; autoclaves; heat exchangers and liquid heaters.

"Hewitt-Robins Style J Vibrex." Bulletin No. 122-J. Hewitt-Robins, Inc., Stamford, Conn. 8 pages. This publication describes and illustrates the construction and operation of the company's new vibrating screen. Suggested applications are also contained.

"Report of the No. 1 Mill Committee." National Joint Industrial Council for the Rubber Manufacturing Industry, Cross St., Manchester, England. 6 pages. The safe working of horizontal two-roll mills, from 16-inch roll diameter upward, is discussed in this publication.

"Westinghouse Speed Reducers." Booklet B-5646. Westinghouse Electric Corp., Pittsburgh, Pa. 16 pages. The complete line of such machines made by the company is described and illustrated, with the equipment features, manufacturing techniques, and applications of the units discussed in some detail. In addition, other speed reducers developed for the rubber industry are covered.

Publications of the Reconstruction Finance Corp., Office of Synthetic Rubber, Washington 25, D. C.

"Specifications for X-710." "Specifications for X-711." October 15, 1953. 1 page each. These sheets are intended for inclusion in "Specifications for Government Synthetic Rubbers, Revised Edition," October 1, 1953.

Publications of American Standards Association, Inc., 70 E. 45th St., New York 17, N. Y.

"Standards Are Your Business." 24 pages. Production standards and their value as tools of management are discussed.

"The Members of ASA." June, 1953. 40 pages. This booklet is a listing of the member bodies, and some 2,300 are contained.

Publications of Dow Corning Corp., Midland, Mich.

"Dow Corning Silicone News." Vol. 1, No. 1. 2 pages. The first in a new Silicone News series, this publication appears as an insert in design magazines and is available independently from the company. Silicone products and their respective applications are described.

"Silastic Facts." Technical Data 9-312. 2 pages. This data sheet, superseding that designated F-8 2502, gives specifications, typical properties, and curing information on Silastic 250.

"Silastic Fabricators." August, 1953. 4 pages. A listing of the firms which fabricate Silastic products is contained.

"Silastic Facts Notebook." April 10, 1953. 93 pages. The complete set of Silastic Facts bulletins, concerning properties, applications, fabricating processes, AMS and SAE-ASTM specifications, prices, and fabricators for silicones, appear in this loose-leaf binder.

"Silastic Notes." Preliminary Data 9-208. 3 pages. The blending and coloring of Silastic 50 and Silastic 80 are discussed in this catalog insert.

"Silastic Newsletter." Vol. I, No. 4. 4 pages. Described in this publication are: Silastic 675,[1] a silicone rubber having low compression set and low shrinkage; Silastic 132,[1] a cloth coating paste; O-ring seals in oil processing plants; thermal conductivity of Silastic 50 and 80; Silastic *versus* organic rubber for roll covering; markets for Silastic; and data on the chemical resistance of Silastic 50, 80, and 8-164 as indicated by swell and changes in durometer reading.

[1] See p. 254.

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MARKET REVIEWS

RUBBER

SHARP drops that saw rubber prices tumble to levels not equaled since March, 1950, were noted during the period from September 16 to October 15. During the second half of September both spot and futures prices showed a slow decline as buyers limited their purchases to the downswings and, even then, bought only in moderate quantities. Supplies piling up both in domestic and foreign markets brought sharp drops in October. Contributing to the decline was the weakness of the London market where speculators unloaded their holdings to force the market down still further.

Trade sources generally believe that the rubber market picture for the immediate future is not bright owing to (1) ample factory inventories by domestic consumers; (2) mounting Far Eastern stocks where growers have withheld shipments in hopes of an improved market; (3) increasing world stocks of rubber while buying has been on a hand-to-mouth basis; and (4) some belief that the new RFC sales policy for synthetic rubber (requiring three-month advance placement of non-cancellable orders) will result in more cautious buying of natural rubber.

NEW YORK SPOT MARKET
WEEK-END CLOSING PRICES

	July 25	Aug. 29	Sept. 19	Sept. 26	Oct. 3	Oct. 10
R.S.S.: #1	23.63	23.50	23.38	22.88	22.75	21.00
2	22.88	23.13	22.88	22.13	22.00	20.38
3	22.13	22.13	21.88	21.25	21.00	19.25
Latex Crepe:						
#1 Thick	26.00	28.00	28.25	28.00	27.88	27.00
Thin	25.38	28.38	25.25	24.88	24.88	24.00
#3 Amber Blankets	21.63	20.25	19.75	19.38	19.13	17.75
Thin Brown Crepe	19.63	19.38	19.13	18.50	18.50	17.13
Flat Bark	18.13	17.88	17.63	17.25	17.00	15.75

The spot price for #1 Ribbed Smoked Sheets started the period at a high of 23.38¢, fell to a low of 20.23¢ on October 13, and closed at 20.50¢ on October 15. The September monthly average spot prices for certain grades were as follows: #1 R.S.S., 23.25¢; #3 R.S.S., 21.71¢; #3 Amber Blankets, 19.78¢; Flat Bark, 17.59¢.

COMMODITY EXCHANGE
WEEK-END CLOSING PRICES

Futures	July 25	Aug. 29	Sept. 19	Sept. 26	Oct. 3	Oct. 10
Dec.	22.94	22.95	23.10	22.70	22.55	20.60
Mar.	22.75	22.90	23.10	22.65	22.45	20.75
May	22.65	22.90	23.10	22.60	22.45	20.75
July	22.55	22.90	23.10	22.60	22.40	20.75
Sept.	22.45	22.90	23.10	22.60	22.40	20.75
Dec.	....	....	23.15	22.60	22.40	20.75
Total weekly sales, tons	720	960	260	2,070	790	4,130

Activity and price movements in rubber futures trading on the New York Commodity Exchange reflected conditions in the spot market. While sales in futures showed an overall increase over preceding months, most of the activity consisted of hedgings, liquidations, and switching operations and was centered in the March, May, and nearby December deliveries. December futures started the period at a high of 23.15¢, dropped to a low of 19.90¢ on October 13, and were quoted at 20.60¢ on October 15. Sales of rubber futures during the second half of September amounted to 2,730 tons, making a total for the month of 6,090 tons. Sales during the first half of October were 5,790 tons.

Latex

THE latex market was in a depressed state during the period from September 16 to October 15. Consumption of latex has declined while supplies are ample. Despite a drop in *Hevea* bulk latex prices to 30¢ a pound, dry solids, for spot delivery and 29¢ for future delivery, buying interest was almost non-existent in view of large inventories. Buyers had stocked up because of the threats of labor difficulties in Indonesia and dock strikes along the Atlantic Coast. No significant change in the market picture is expected during the balance of this year, but some improvement in consumption is looked for during the first quarter of 1954.

Final July and preliminary August domestic statistics on natural and synthetic rubber latices are given in the following table:

(All Figures in Long Tons, Dry Weight)

	Production	Imports	Consumption	Month-End Stocks
Natural latex				
July	0	6,691	5,100	9,256
Aug.*	0	6,000	5,191	11,046
GR-S latices				
July	3,799	198	3,750	5,861
Aug.*	3,058	91	3,607	5,253
Neoprene latex				
July	571	0	554	1,162
Aug.*	753	0	682	1,123
Nitrile latices				
July	486	0	298	514
Aug.*	633	0	352	570

*Preliminary.

RECLAIMED RUBBER

THERE was some easing off in demand for reclaimed rubber during the period from September 16 to October 15. Consumption of reclaim by the tire industry continued at about the same level as in preceding months, but demand by other rubber manufacturing fields fell off. The immediate outlook for the reclaim market is somewhat uncertain in view of falling natural rubber prices and indications of some tapering off in the domestic production of rubber goods.

Final July and preliminary August statistics on the domestic reclaimed rubber industry are now available. July figures, in long tons, are: production, 23,001; imports, 291; consumption, 23,414; exports, 807; and month-end stocks, 31,506. Preliminary August statistics, in long tons, follow: production, 22,593; imports, 265; consumption, 22,322; exports, 885; and month-end stocks, 30,210.

There were no changes in reclaimed rubber prices during the period, and current prices follow:

Reclaimed Rubber Prices

	Lb.
Whole tire: first line	$0.10
Fourth line	.0875
Inner tube: black	.15
Red	.2425
Butyl	.125
Pure gum, light colored	.2425
Mechanical, light colored	.135

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

SCRAP RUBBER

DULL trading again characterized the scrap rubber market during the period from September 16 to October 15. The awaited placing of October orders for scrap by reclaimers came early in the month, but did not fulfill dealers' expectations of an upswing in demand. Barring unforeseen developments, demand for scrap rubber for the month of October may not exceed the low total set in September.

Scrap rubber prices continued to ease off in some grades, but, in view of the slow market, most price quotations could be considered only nominal. Following are dealers' selling prices for scrap rubber, in carload lots, delivered to mills at the points indicated:

	Eastern Points	Akron, O.
	(Per Net Ton)	
Mixed auto tires	$11.00	$12.00
S. A. G. auto tires	Nom.	Nom.
Truck tires	Nom.	15.00
Peelings, No. 1	40.00	40.00/42.00
2	Nom.	24.00
3	14.00/15.00	Nom.
	(¢ per Lb.)	
Auto tubes, mixed	2.00	2.25
Black	3.25	4.00
Red	9.75	10.00
Butyl	1.75	2.00

COTTON AND FABRICS

NEW YORK COTTON EXCHANGE
WEEK-END CLOSING PRICES

Futures	July 25	Aug. 29	Sept. 19	Sept. 26	Oct. 3	Oct. 10
Dec.	34.10	33.65	33.14	33.19	32.82	32.63
Mar.	34.31	33.90	33.53	33.56	33.25	33.05
May	34.34	33.89	33.68	33.71	33.51	33.32
July	34.18	33.71	33.56	33.67	33.42	33.25
Oct.	33.42	33.45	33.13	33.29	33.03	33.02
Dec.	33.42	33.50	33.18	33.31	33.05	33.05

HEDGING pressure, in the absence of any bullish trends, served to send spot and future prices creeping downward on the New York Cotton Exchange during the period from September 16 to October 15. Adding to the decline was the Agriculture Department's October 8 estimate that the 1953 cotton crop will be 15,596,000 bales, 3% higher than last year's. This large crop is the result of greater yields per acre, since total cotton acreage was reduced this year to 9% below the 1952 level.

As expected in view of the forecast, a national cotton acreage allotment of 17,910,448 acres for the 1954 crop was announced on October 12. The minimum permissible allotment under the present farm law, the 1954 figure is designed to allow production and marketing of 10,000,000 bales, but will probably be exceeded because of greater yields. Approval of marketing quotas based on individual shares of the allotment will be subjected to a grower referendum on December 15. This approval is considered to be almost automatic since support prices will drop to 50% of parity unless two-thirds of the farmers balloting favor the quotas.

The spot price for $^{15}/_{16}$-inch middling cotton started the period at 33.60¢, rose to a high of 33.75¢ on September 25 and 28, dropped to a low of 33.35¢ on October 5, 6, 8, and 9, and then made a short-lived recovery on October 15 to close at 33.60¢. December futures prices started the period

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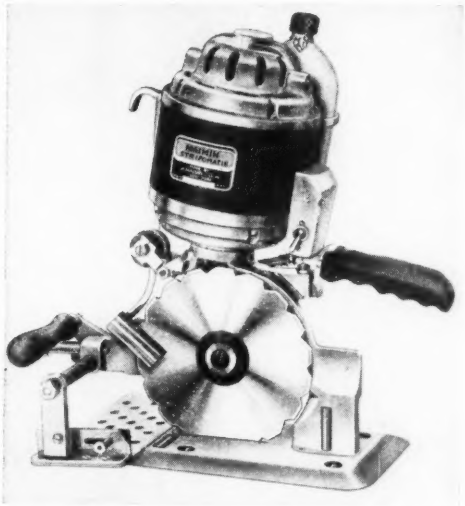

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at a high of 33.29¢, fell to a low of 32.57¢ on October 5, and ended the period at 32.91¢.

Fabrics

Trading in wide industrial cotton fabrics, such as sateens and drills, was modest in volume, with most sales to coaters being made for nearby delivery to meet needs. Most buyers of wide goods were not covering for more than a month ahead, and only scattered sales were made for December or later delivery. A moderate improvement in demand for ducks has taken place, but the total volume of sales is still only fair. Mill inventories of ducks are at very low points, and any pick-up in demand by customers will be reflected in brisker sales to mills. Fabric prices were relatively steady, although some softening of chafer and hose and belting duck prices took place following a decrease in demand.

Cotton Fabrics

Drills		
59-inch 1.85-yd.	*yd.*	$0.3775
2.25-yd.		.335
Osnaburgs		
40-inch 2.11-yd.	*yd.*	.2425
3.65-yd.		.16
Ducks		
38-inch 1.78-yd. S. F.	*yd.*	nom.
2.00-yd. D. F.		nom.
51.5-inch, 1.35-yd. S. F.		nom.
Hose and belting		.64
Raincoat Fabrics		
Printcloth, 38½-inch, 64x60	*yd.*	.1525 / .155
Sheeting, 48-inch, 4.17-yd.		.22
52-inch, 3.85-yd.		.23⅞
Chafer Fabrics		
14.30-oz./sq. yd. Pl.	*lb.*	.71
11.65-oz./sq. yd. S.		.63
10.80-oz./sq. yd. S.		.6675
8.9-oz./sq. yd. S.		.68
Other Fabrics		
Headlining, 59-inch, 1.65-yd., 2-ply	*yd.*	.485 / .49
64-inch, 1.25-yd., 2-ply		.6175 / .6225
Sateens, 53-inch, 1.32-yd.		.5675
58-inch, 1.21-yd.		.62

RAYON

TOTAL shipments of all types of rayon by domestic producers during September amounted to 87,100,000 pounds, 11% below the August level. Total production in September was 91,200,000 pounds, or 66% of rated capacity, and month-end stocks were 106,200,000 pounds. Production of viscose high-tenacity yarn during September totaled 39,800,000 pounds, or 87% of rated capacity, a decrease of 3,700,000 pounds from the August figure. Shipments of high-tenacity yarn in September also declined to 34,600,000 pounds; while month-end stocks rose to 11,200,000 pounds.

Production of tire cord and fabric during the second quarter of this year totaled 140,000,000 pounds, 3% above the first-quarter figure. Of this total, 6,000,000 pounds were of cotton tire cord and fabric; 95,000,000 pounds were of woven rayon tire fabric; 19,000,000 pounds were of rayon tire cord; 4,000,000 pounds were nylon cord and fabric; and 16,000,000 pounds were of cotton chafer fabric. Output of rayon tire fabric for the period was a new high; while production of rayon tire cord dropped back 5% from the high established in the preceding period.

No changes were made in rayon tire yarn and fabric prices during the period from September 16 to October 15, and current prices follow:

Rayon Prices

Tire Yarns

1100/ 480	$0.62 /	$0.63
1100/ 490		.62
1150/ 490		.62
1165/ 480		.63
1650/ 720		.61
1650/ 980		.61
1820/ 980		.61
2200/ 960		.60
2200/ 980		.60
2200/1466		.67
4400/2934		.63

Tire Fabrics

1100/490/2		$0.72
1650/980/2	$0.659 /	.73
2200/980/2		.685

Trade Lists Available

The Commercial Intelligence Division recently published the following trade lists, of which mimeographed copies may be obtained by firms domiciled in the United States from this Division and from United States Department of Commerce Field Offices. The price is $1 a list for each country.

Automotive Vehicle & Equipment Importers & Dealers: Guadeloupe, Martinique, and French Guiana.

Boot & Shoe Manufacturers: Japan.

Dental Supply Houses: Canada.

Electrical Supply & Equipment Importers & Dealers: Australia; Morocco.

Office Supply & Equipment Importers & Dealers: France.

Plastic Material Manufacturers, Molders, Laminators & Fabricators: Australia; Denmark; Egypt; Netherlands.

Foreign Trade Opportunities

The firms and industries listed below recently expressed their interests in buying in the United States or in United States representations. Additional information concerning each import or export opportunity, including a World Trade Directory Report, is available to qualified United States firms and may be obtained upon inquiry from the Commercial Intelligence Unit of the United States Department of Commerce, Washington, D. C., or through its field offices, for $1 each. Interested United States companies should correspond directly with the concerns listed concerning any projected business arrangements.

Export Opportunities

Etablissements R. Lammers & Co., 81 rue Mercelis, Brussels, Belgium: surgical rubber goods, industrial rubber goods, insulating fabrics.

L.P.A. Zwaans, 37 Wilhelminakanaal, Oosterhout, Netherlands: all kinds of rubber goods.

Etablissements Jacques Vernet, 1 Rue Veloutine, Avignon (Vaucluse), France: dental supplies and products.

General Commercial Office, P. O. Box 689, 8 Farouk St., Cairo, Egypt: polystyrene and other raw materials used in the plastic products industry.

Cia. Tecnico Plastica Milanese, Via Andegari 4, Milan, Italy: polyvinyl chloride, polyethylene, and teflon, both raw material and finished form.

Import Opportunities

Chunilal Parmanand, P. O. Box 55, Port Sudan, Sudan: gum arabic.

Baho Trading Co. 23 — 28th St., Rangoon, Burma: Burma smoked raw rubber sheets, grade M.R.A.

Shinwa Trading Co., Ltd., 2 Nihonbashi Ryogoku Chuo-ku, Tokyo, Japan: rubber toys.

Financial

(*Continued from page 246*)

Brunswick-Balke-Collender Co., Chicago, Ill. First nine months, 1953: net earnings, $157,238, equal to 15¢ a share, against $343,619, or 56¢ a share, in the 1952 months.

Johns-Manville Corp., New York, N. Y., and subsidiaries. Nine months ended September 30, 1953: net earnings, $15,850,435, equal to $5 each on 3,170,472 capital shares, compared with $18,122,613, or $5.72 each on 3,165,534 shares, in the like period last year; sales, $188,832,450, against $179,228,524.

Mansfield Tire & Rubber Co., Mansfield, O. First half, 1953: net income, $831,332, equal to $1.50 a common share, against $591,321, or $1.07 a share, a year earlier; net sales, $33,192,858, against $25,737,237.

Monsanto Chemical Co., St. Louis, Mo. Nine months to September 30, 1953: net earnings, $19,687,960, equal to $3.65 a share, contrasted with $16,080,360, or $2.97 a share, in the like period last year; sales, $258,026,886, against $189,290,342.

Parker Appliance Co., Cleveland, O. September quarter, 1953: net profit, $281,009, equal to 73¢ a share, against $277,807, or 59¢ a share, in the 1952 period.

Union Carbide & Carbon Corp., New York, N. Y. First nine months, 1953: net earnings, $78,897,595, equal to $2.72 each on 28,952,794 capital shares, against $70,739,620, or $2.45 each on 28,806,344 shares, in the 1952 months; sales, $782,865,344, against $684,600,779.

United States Rubber Statistics—July, 1953

(All Figures in Long Tons, Dry Weight)

	New Supply			Distribution		
	Production	Imports	Total	Consumption	Exports	Month-End Stocks
Natural rubber, total	0	47,970	47,970	38,829	596	109,569
Latex, total	0	6,691	6,691	5,100	0	9,256
Rubber and latex, total	0	54,661	54,661	43,929	596	118,825
Synthetic rubbers, total	*71,681 †7,679	834	80,194	61,299	1,910	158,486
GR-S types‡	*65,181 †55	834	66,070	48,916	765	127,278
Butyl	*6,500	0	6,500	6,616	4	18,280
Neoprene‡	†6,030	0	6,030	4,581	905	10,036
Nitrile types‡	†1,594	0	1,594	1,186	236	3,892
Natural rubber and latex, and synthetic rubbers, total	79,360	55,495	134,855	105,228	2,506	277,311
Reclaimed rubber, total	23,001	291	23,292	23,414	807	31,506
GRAND TOTALS	102,361	55,786	158,147	128,642	3,313	308,817

*Government plant production.
†Private plant production.
‡Includes latices.
SOURCE: Chemical & Rubber Division, NPA, United States Department of Commerce, Washington, D. C

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Effective July 1, 1947

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Address All Replies to New York Office at 386 Fourth Avenue, New York 16, N. Y.

SITUATIONS OPEN

PROMINENT NATIONAL PACKING MANUFACTURER

has an opening in his modern research center for an experienced rubber compounder to devote full time to developing and compounding from synthetic and natural rubbers products to meet specifications for industrial applications. Finest equipment and facilities in Northern New Jersey location. Our employees have been told of this advertisement. Apply Box 1383, c/o India RUBBER WORLD.

SOLING CHEMIST

Several years' background in development and production of soling stocks. Excellent opportunity.

ADDRESS BOX NO. 1394
C/O India RUBBER WORLD

RUBBER TECHNOLOGIST—GRADUATE CHEMIST OR CHEMical Engineer, versatile and aggressive, with at least 2 years' experience in compounding and factory processing of composition and cellular soling. Excellent opportunity for advancement to position of responsibility. Location Southern New England, with nationally known rubber manufacturing concern. In first letter give complete resume of experience, education, and expected salary. Address Box No. 1384, care of INDIA RUBBER WORLD.

CHEMIST, GRADUATE CHEMIST PREFERABLY WITH RUBBER footwear experience for development and control work. Midwestern location. Congenial group. Compensation commensurate with experience. Address Box No. 1385, care of INDIA RUBBER WORLD.

DEVELOPMENT CHEMIST: RECENT GRADUATE CHEMIST with or without rubber experience for both pilot and plant development work. Midwestern location. Pleasant working conditions. Address Box No. 1386, care of INDIA RUBBER WORLD.

OPPORTUNITY

For the right man, rubber chemist with experience in latex compounding. Research and quality control with a small well-established firm in southeastern Pennsylvania. Familiarity with vinyls an added asset. Address Box No. 1387, care of INDIA RUBBER WORLD.

AIR BAG BUFFING MACHINERY
STOCK SHELLS **HOSE POLES**
MANDRELS

NATIONAL SHERARDIZING & MACHINE CO.
868 WINDSOR ST. HARTFORD, CONN.
Akron Representatives San Francisco New York

GOOD USED MACHINERY

WANTED: YOUR IDLE EQUIPMENT

1—Farrel Birmingham 6″ x 13″ self-contained 3-roll Calender, m.d.
1—6″ x 12″ Laboratory Mill, m.d.
2—Ball & Jewell #2 Rotary Cutters; 1—#1; 1, with 3 h.p. motor.
3—#28 Devine Vac. Shelf Dryers, 19-59″ x 78″ shelves, complete.
1—16″ x 40″ Rubber Mill, m.d.
4—Bolling 18″ x 18″, 5-opening Hydraulic Presses, 10″ dia. ram.
3—Royle #4, #3, #1.
1—300-gal. closed jack. Nickel Kettle.
Also other sizes Hydraulic Presses, Tubers, Banbury Mixers, Mills, Vulcanizers, Calenders, Pellet Presses, Cutters.

PHONE—WIRE—WRITE • ***Send us your inquiries***

Consolidated Products Company, Inc.
13-16 Park Row, New York 38, N. Y. BArclay 7-0600
Cable Address: Equipment N.Y.
"Our 36th Year"

SITUATIONS WANTED

FOREMAN OR CALENDER MAN WITH MANY YEARS' EXPERience in rubber and plastics seeks position in East. Best references. Address Box No. 1388, care of INDIA RUBBER WORLD.

POSITION WANTED: SEVEN YEARS' EXPERIENCE IN CARbon black industry in supervision of testing and evaluation laboratories. Experience includes development, customer service problems, production quality in both rubber and color black laboratories. Address Box No. 1389, care of INDIA RUBBER WORLD.

CANADIAN RUBBER CHEMIST, CH. ENG.

18 years' experience in compounding and processing mechanicals, drug sundries, footwear, vinyl. Now employed in managerial position, available for work in Canada or Europe. Would consider technical sales. Address Box No. 1390, care of INDIA RUBBER WORLD.

LATEX CHEMIST, OVER 10 YEARS IN RESPONSIBLE POSItion, mainly compounding, dipping, coating. Special interest in research and development. Address Box No. 1396, care of INDIA RUBBER WORLD.

MACHINERY & SUPPLIES FOR SALE

KUX MODEL 25 ROTARY PELLET PRESSES, 21 AND 25 PUNCH. Stokes Rotary Pellet Presses model RD-3 (16 punch) and model RDS-3 (15 punch). Ball & Jewell #1½ stainless steel rotary cutter. Mikro Pulverizers #1-SH, #1-SI, #2-TH, #2-SI and 24″. Large stock steel and stainless tanks and kettles. PERRY EQUIPMENT CORP., 1424 N. 6th St., Phila. 22, Pa.

FOR SALE: FARREL 16″ X 48″ AND 15″ X 36″, 2-ROLL RUBBER Mills, and other sizes up to 84″. Also new & used lab. 6″ x 12″ & 6″ x 16″ mixing mills and calenders. Two gangs Amer. Tool 300-gals. agitated churns each with 25 H.P. motor. Extruders 1″ to 6″. Baker-Perkins Jacketed Mixers 100, 50, and 9 gals., heavy-duty double-arm. 350-Ton upstroke Hydr. Press 22″ x 24″ platens. 325-Ton upstroke 42″ x 24″ platens. Brunswick 200 ton 21″ x 21″ platens. Large stock of hydraulic presses from 12″ x 12″ to 48″ x 48″ platens, from 50 to 2,000 tons. Hydraulic Pumps and Accumulators. Rotary Cutters. Stokes Automatic Molding Presses. Single Punch & Rotary Preform Machines. Banbury Mixers. Crushers, Churns, Rubber Bale Cutters, etc. SEND FOR SPECIAL BULLETIN. WE BUY YOUR SURPLUS MACHINERY. STEIN EQUIPMENT CO., 107—8th St., Brooklyn 15, N. Y. Sterling 8-1944.

FOR SALE: ONE ALLEN-WILLIAMS 8″ STRAINER (National-Erie) with perforated straining barrel 12½″ lg. Has liner to use in place of screens and extra head for die holder for extruding. Complete with 30 H.P. G. E. Motor, 220 V., 3 ph. 60 cycle. Operating. Excellent condition. $3,300.00. Address Box No. 1391, care of INDIA RUBBER WORLD.

FOR SALE: THREE SETS 16″ x 42″ BIRMINGHAM RUBBER Roll Mills, one 16″ x 24″ Birmingham roll mill with 42-feet endless conveyor belt. All mills have side adjusting screws. Address Box No. 1392, care of INDIA RUBBER WORLD.

BUYING-SELLING

All kinds of *used* machinery for the Rubber and Allied Industries.

OFFERING NEW MACHINERY

Hydraulic Presses, Laboratory Mills and Presses, Sponge Rubber Vulcanizing Presses, Drilled Steel Steam Platens, Rubber Bale Cutters guillotine type, Vulcanizers with quick opening doors, etc.

HIGH EFFICIENCY IN QUALITY, PRICE AND DELIVERY TIME

ERIC BONWITT 431 S. Dearborn Street Chicago 5, Ill.

HYDRAULIC PRESSES FOR SALE

10 used Elmes hydraulic presses, 200-ton capacity, platen size 27½ by 26″, 3,000 lbs. working pressure, 12″ stroke, 29½″ daylight, ram size 13″ diameter. Additional presses later. Can be seen at our plant.

Victor Manufacturing & Gasket Co.
5750 West Roosevelt Rd.
Chicago 50, Ill.
Telephone: Austin 7-6180

U. S. Imports, Exports, and Reexports of Crude and Manufactured Rubber

June, 1953

	Quantity	Value
Exports of Domestic Merchandise		
UNMANUFACTURED, LBS.		
Chicle and chewing gum bases	312,768	$132,357
Balata, gutta percha, etc.	1,200	3,030
Synthetic rubbers		
GR-S type	1,710,522	455,745
Butyl	3,980	826
Neoprene	1,659,603	696,347
Nitrile type	576,370	296,175
Other	38,813	36,958
Reclaimed rubber	2,155,490	183,886
Scrap rubber	2,375,821	59,152
TOTALS	8,834,567	$1,864,476
MANUFACTURED		
Rubber cement *gals.*	84,773	$217,770
And rubberized fabric *sq. yds.*	185,539	170,065
Rubberized clothing		188,019
Footwear		
Boots and shoes *prs.*	9,341	37,556
Rubber-soled canvas shoes *prs.*	13,905	24,533
Heels *doz. prs.*	41,864	46,962
Soles, soling, topliff sheets *lbs.*	1,157,580	243,945
Gloves and mittens *doz. prs.*	16,844	75,614
Drug sundries		201,886
Toys, balls, novelties		51,979
Hard rubber goods		
Battery boxes *no.*	15,423	24,509
Other electrical goods *lbs.*	88,655	72,543
Other		19,771
Rubber tires and casings		
Truck and bus *no.*	52,269	2,313,842
Auto and motorcycle *no.*	85,061	999,456
Aircraft *no.*	2,152	119,112
Off-the-road *no.*	9,226	1,050,699
Farm tractor *no.*	4,164	171,576
Implement *no.*	3,020	24,404
Other *no.*	9,522	39,472
Inner tubes		
Auto *no.*	23,755	45,266
Truck and bus *no.*	35,671	175,176
Aircraft *no.*	1,654	11,770
Other *no.*	50,635	59,670
Solid tires		
Truck and commercial *no.*	3,314	42,890
Tire repair material		
Camelback *lbs.*	433,068	133,569
Other *lbs.*	231,935	215,495
Tape, except medical and friction *lbs.*	76,200	46,653
Belting		
V-type, auto, fan *lbs.*	69,686	98,308
Transmission		
V-type *lbs.*	64,889	144,899
Flat belts *lbs.*	53,306	79,128
Conveyor and elevator *lbs.*	205,663	171,583
Other *lbs.*	21,348	12,016
Hose		
Molded and braided *lbs.*	293,639	243,719
Wrapped and hand built *lbs.*	95,080	91,474
Other hose and tubing *lbs.*	91,810	98,730
Packing		
Sheet type *lbs.*	28,893	19,653
Other *lbs.*	151,432	200,058
Tiling and flooring *lbs.*	141,983	43,457
Mats and matting *lbs.*	413,812	118,020
Thread		
Bare *lbs.*	25,243	43,379
Textile covered *lbs.*	19,098	68,757
Compounded rubber for further manufacture *lbs.*	375,372	195,939
Other rubber manufactures		572,370
TOTALS		$9,025,692
GRAND TOTALS, ALL RUBBER EXPORTS		$10,890,168
Reexports of Foreign Merchandise		
UNMANUFACTURED, LBS.		
Crude rubber	915,322	$273,179
Synthetic rubber: S type	11,571	5,490
TOTALS	926,893	$278,669
MANUFACTURED		
Rubber drug sundries		$637
Gloves and mittens *doz. prs.*	90	301
Toys, balls, novelties		731
TOTALS		$1,669
GRAND TOTALS, ALL RUBBER REEXPORTS		$280,338

June, 1953

	Quantity	Value
Imports for Consumption of Crude and Manufactured Rubber		
MANUFACTURED		
Rubber tires		
Auto, etc. *no.*	7,987	$271,366
Bicycles *no.*	5,550	5,484
Other *no.*	43	842
Inner tubes: auto, etc. *no.*	1,875	6,032
Footwear		
Boots *prs.*	4,308	12,788
Shoes and overshoes *prs.*	43,297	25,163
Rubber-soled canvas-shoes *prs.*	9,593	6,083
Athletic balls		
Golf *no.*	22,800	5,903
Tennis *no.*	21,696	5,421
Other *no.*	100,372	5,212
Toys		38,002
Hard rubber goods		
Combs *no.*	26,417	3,374
Drug sundries		215
Other		50,644
Rubberized printing blankets *lbs.*	2,732	5,904
Rubber and cotton packing *lbs.*	1,724	3,037
Friction tape *lbs.*	950	141
Gasket and valve packing		788
Molded insulators		10,485
Belting *lbs.*	9,865	15,082
Hose and tubing		1,401
Gloves *prs.*	48,400	14,847
Nipples and pacifiers *gr.*	3,050	3,490
Instruments *doz.*	5,640	7,270
Bands *lbs.*	3,144	3,189
Other		324
Gutta percha manufactures *lbs.*	1,532	1,557
Other soft rubber goods		159,876
TOTALS		$563,920

June, 1953

	Quantity	Value
Imports for Consumption of Crude and Manufactured Rubber		
UNMANUFACTURED, LBS.		
Crude rubber	123,245,125	$26,430,694
Latex	14,342,429	3,786,254
Balata	237,207	56,457
Jelutong or Pontianak	201,426	93,063
Gutta percha	36,362	16,565
Crude chicle	5,283	1,892
Synthetic rubber	2,057,672	541,404
Reclaimed rubber	534,464	32,363
Scrap rubber	3,324,132	134,504
TOTALS	143,984,100	$31,093,196
GRAND TOTALS, ALL RUBBER IMPORTS		$31,757,116

SOURCE: Bureau of the Census, United States Department of Commerce, Washington, D. C.

Compounding Ingredients—Price Changes and Additions

Antioxidants			
Stephen I *lb.*	$0.51	/	$0.55
Mold Lubricants			
Polyglycol E series *lb.*	.29	/	.42
Plasticizers and Softeners			
Baker AA Oil *lb.*	.215	/	.26
Crystal O Oil *lb.*	.215	/	.275
Processed oils *lb.*	.22	/	.255
Chlorowax 40 *lb.*	.145	/	.225
Synthetic Rubbers and Latices			
Silastic *lb.*	2.30	/	4.05

Estimated Pneumatic Casings, Tubes, and Camelback Shipments, Production, and Inventory—August, July, 1953; First Eight Months, 1953, 1952

	Original Equipment	Replacement	Export	Total	Production	Inventory
Passenger Casings						
August, 1953	2,757,371	4,648,673	87,181	7,493,225	6,405,649	10,683,635
Change from previous month				−8.98%	−9.93%	−8.97%
July, 1953	3,180,726	4,952,844	98,815	8,232,385	7,111,880	11,735,733
1st 8 mos., 1953	23,632,329	34,370,858	483,690	58,486,877	57,906,505	10,683,635
1952	14,487,132	32,804,639	466,375	47,758,146	48,438,056	7,785,069
Truck and Bus Casings						
August, 1953	372,361	874,452	57,535	1,304,348	1,010,344	2,866,203
Change from previous month				−1.40%	−4.80%	−8.92%
July, 1953	434,806	840,349	47,644	1,322,799	1,061,243	3,146,823
1st 8 mos., 1953	3,483,544	6,437,694	459,391	10,380,629	10,384,351	2,866,203
1952	3,389,077	5,658,445	575,254	9,622,776	10,669,920	2,851,786
Total Automotive Casings						
August, 1953	3,129,732	5,523,125	144,716	8,797,573	7,415,993	13,549,838
Change from previous month				−7.93%	−9.26%	−8.96%
July, 1953	3,615,532	5,793,193	146,459	9,555,184	8,173,123	14,882,556
1st 8 mos., 1953	27,115,873	40,808,552	943,081	68,867,506	68,290,856	13,549,838
1952	17,876,209	38,463,084	1,041,629	57,380,922	59,107,976	10,636,855
Tractor-implement Casings						
August, 1953	138,948	105,131	5,314	249,393	262,089	757,181
Change from previous month				−18.16%	−5.50%	+2.10%
July, 1953	161,956	137,287	5,484	304,727	277,336	741,639
1st 8 mos., 1953	1,932,789	1,045,529	42,484	3,020,802	2,893,697	757,181
1952	2,041,490	951,855	72,424	3,065,769	3,136,519	760,595
Passenger, Motorcycle, Truck and Bus Inner Tubes						
August, 1953	3,139,369	3,315,332	74,670	6,529,371	5,678,711	10,225,911
Change from previous month				−10.58%	−11.20%	−15.47%
July, 1953	3,614,209	3,614,225	73,254	7,301,688	6,394,681	12,097,192
1st 8 mos., 1953	27,132,925	27,020,472	501,229	54,654,626	53,836,026	10,225,911
1952	17,851,016	23,541,766	746,345	42,139,127	42,710,420	10,627,482
Camelback (Lbs.)						
August, 1953	—	23,390,554	584,836	23,975,390	20,276,813	29,824,673
Change from previous month				+0.53%	−4.28%	−8.73%
July, 1953	—	23,505,421	342,978	23,848,399	21,182,755	32,675,395
1st 8 mos., 1953	—	169,549,415	5,022,534	174,571,949	178,740,208	29,824,673
1952	—	154,389,760	3,487,680	157,877,440	155,946,560	19,120,640

NOTE: Cumulative data on this report include adjustments made in prior months.
SOURCE: The Rubber Manufacturers Association, Inc., New York, N. Y.

CLASSIFIED ADVERTISEMENTS

Continued

MACHINERY AND SUPPLIES FOR SALE (Continued)

FOR SALE: 1—10" x 20" RUBBER MILL, M. D., TWO HORIzontal Vulcanizers, 6' x 12' and 5' x 12', quick-opening doors. Two Royle #4 6" extruders. Chemical & Process Machinery Corp., 148 Grand Street, New York 13, N. Y.

MACHINERY & SUPPLIES WANTED

WANTED: ONE 18 x 30 OR 36 RUBBER ROLLING MILL, COMplete. Must be in perfect operating condition. Morskil Co., Inc., 415 Lexington Avenue, New York 17, N. Y.

WANTED: PLANT OR MACHINERY INCL. RUBBER MILLS, Calenders, Mixers, Banbury Mixers, Extruders, Grinders, Cutters, Hydraulic Presses, Injection Molding Machines. CONSOLIDATED PRODUCTS CO., INC., 13-16 Park Row, New York 38, N. Y. BArclay 7-0600.

Economical **NEW** Efficient

Mills - Spreaders - Churns
Mixers - Hydraulic Presses
Calenders

...GUARANTEED...

Rebuilt Machinery for Rubber and Plastics

LAWRENCE N. BARRY

41 Locust Street Medford, Mass.

RUBBER HARDNESS

THE LANGUAGE OF THE RUBBER INDUSTRY SINCE 1915

DUROMETER

VARIOUS MODELS FOR TESTING THE ENTIRE RANGE

TECHNICAL DATA ON REQUEST

THE SHORE INSTRUMENT & MFG. CO., INC.

90-35 VAN WYCK EXPRESSWAY
JAMAICA 2, N. Y.

AVAILABLE IMMEDIATELY

2—24"x26"x84" Birmingham Heavy Duty Mills
Enclosed Herringbone reduction drive, 200 HP Motor and controls. Good condition, can be inspected in present location.

1—22"x60" Farrel 3 roll Calender, 125 HP Motor and enclosed Herringbone drive. Reconditioned throughout.

1—#9 Banbury Mixer complete with motor, drive and controls. Rebuilt and reconditioned, can be inspected before assembly.

#9 Banbury—As Is, Where Is. Inspection possible in operating location. (Western Area.) Best offer accepted for a quick sale.

Banbury Bodies—2-#9—1-#11 Rebuilt and reconditioned.

The above equipment has become available within the last 60 days and is priced for a quick sale. * WIRE * WRITE * CALL *

AVAILABLE AKRON, OHIO WAREHOUSE

Mills	Grinding Equipment	Presses
Extruders	Motors	New ARMACO 24"x24" 18" Ram
Calenders	All types & size Gears.	Used Presses
Cutters		Platens
Conveyers	Hyd. Equipment	Lab. Mills (New)

WE ARE INTERESTED IN PURCHASING YOUR SURPLUS RUBBER WORKING EQUIPMENT.
BEST PRICES FAST ACTION TRADE

We have buyers for complete rubber plants, all types of products. Send description, machinery inventory and sales record. All details held in strict confidence.

ARMACO

AKRON RUBBER MACHINERY CO., INC.
200 South Forge St. • P.O. Box 88 • Akron 9, Ohio • PHONE HEmlock 9141

USED MACHINERY
FOR SALE

1—Ambaco Model 3A Continuous Baler.
1—Thropp 2-roll Rubber Mill 10"x24".
2—Thropp 2-roll Rubber Mills, 18"x50".
1—Thropp 2-roll Rubber Mill 14" x 30".
1—Adamson Vulcanizer, 2' x 12' with quick opening door.
1—Ball & Jewell Stainless Steel #0 Rotary Cutter with Motor.
1—Paul O. Abbe #2 Master Rotary Cutter with Ball Bearings.
1—Welding Engr. Stainless Steel #2 Extruder.
1—Sprout Waldron Attrition Mill, Type 36 with 2 — 75 HP Motors.
1—Baker Perkins Stainless Steel double-arm jacketed mixer, Sigma blade, 9 gal.

WE ARE INTERESTED IN PURCHASING ALL TYPES OF RUBBER machinery consisting of mills, Banbury mixers, extruders, calenders, vulcanizers etc. and also complete plants.

R.GELB & SONS Inc.
STATE HIGHWAY No.29, UNION, N.J.
UNIONVILLE-2-4900

NEW and REBUILT MACHINERY

Since 1891

L. ALBERT & SON

Trenton, N. J., Akron, Ohio, Chicago, Ill., Los Angeles, Calif.

GUARANTEED REBUILT MACHINERY

IMMEDIATE DELIVERIES FROM STOCK

MILLS, CALENDERS, TUBERS
VULCANIZERS, ACCUMULATORS

UNITED

HYD. PRESSES, PUMPS, MIXERS
CUTTING MACHINES, PULVERIZERS

UNITED RUBBER MACHINERY EXCHANGE

183-189 ORATON ST. CABLE "URME" NEWARK 4, N. J.

Custom Mixing RUBBER - PLASTICS

We do milling and compounding of all types—black or color—master batches

All mixing done under careful supervision and laboratory control.

Phone: Butler 9-0400

Pequanoc Rubber Co.
MANUFACTURERS OF RECLAIMED RUBBER
MAIN SALES OFFICE and FACTORY: BUTLER, N. J.

MANUFACTURING BUSINESS WANTED

We are now manufacturing over $20,000,000 in various lines and wish to expand by acquisition of assets or stock of one or more industrial companies. In our negotiations the sellers' problems and wishes will receive full consideration. Present personnel will normally be retained. Address all replies "confidentially" C. J. GALE, Sec., 233 Broadway, New York 7, N. Y. RE 2-9360

Rubber Plastic Synthetics
Precision Workmanship
CALENDERING & MIXING
Rubber & Plastics: Calendering, Mixing, Grinding & Pulverizing
AS YOU WANT IT. QUICK SERVICE
The Saniseal Mfg. Co. P. O. Box 1315
New Haven, Conn. Tel. Spruce 7-3437

The Classified Ad Columns of INDIA RUBBER WORLD bring prompt results at low cost.

CLASSIFIED ADVERTISEMENTS

Continued

MACHINERY AND SUPPLIES WANTED (Continued)

WANTED: PRESS 42" X 42" OR 44" X 44" WITH 30" OR 36" diameter ram, and 6, 8, or 10 openings. Give full description including make, age, and price desired. Address Box No. 1397, care of INDIA RUBBER WORLD.

EQUIPMENT WANTED: CALENDER 18" X 48" THREE-ROLL with even and friction drive; Mill 10" x 20" or 10" x 24". Specify make, serial number, age, and price. Describe drive. Address Box No. 1398, care of INDIA RUBBER WORLD.

BUSINESS OPPORTUNITIES

FACTORY FOR SALE OR RENT

Rubber plant now producing molded, calendered, and extruded goods. Very low overhead. 9,000 feet of buildings with large adjoining land area. Location: Canada, excellent market and labor area. Address Box No. 1393, care of INDIA RUBBER WORLD.

COMPLETELY EQUIPPED RUBBER MANUFACTURING PLANT for sale in southwestern Pennsylvania, modern late-type equipment, including Banbury, mills, large ram presses for manufacturing molded rubber products; excellent labor market; 25,000 sq. ft. Address Box No. 1395, care of INDIA RUBBER WORLD.

Black White Colors
CUSTOM RUBBER MILLING
Preparation of master batches and complete compounds of every type to meet your specifications and requirements.
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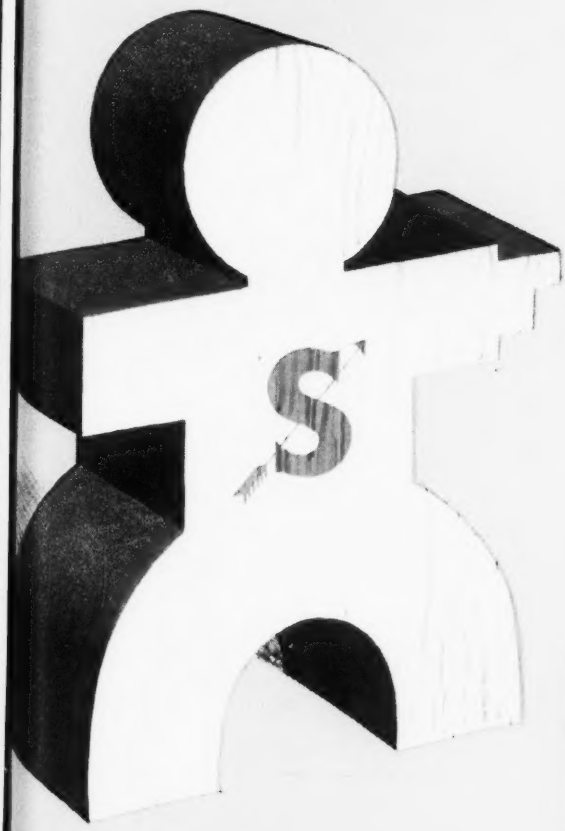

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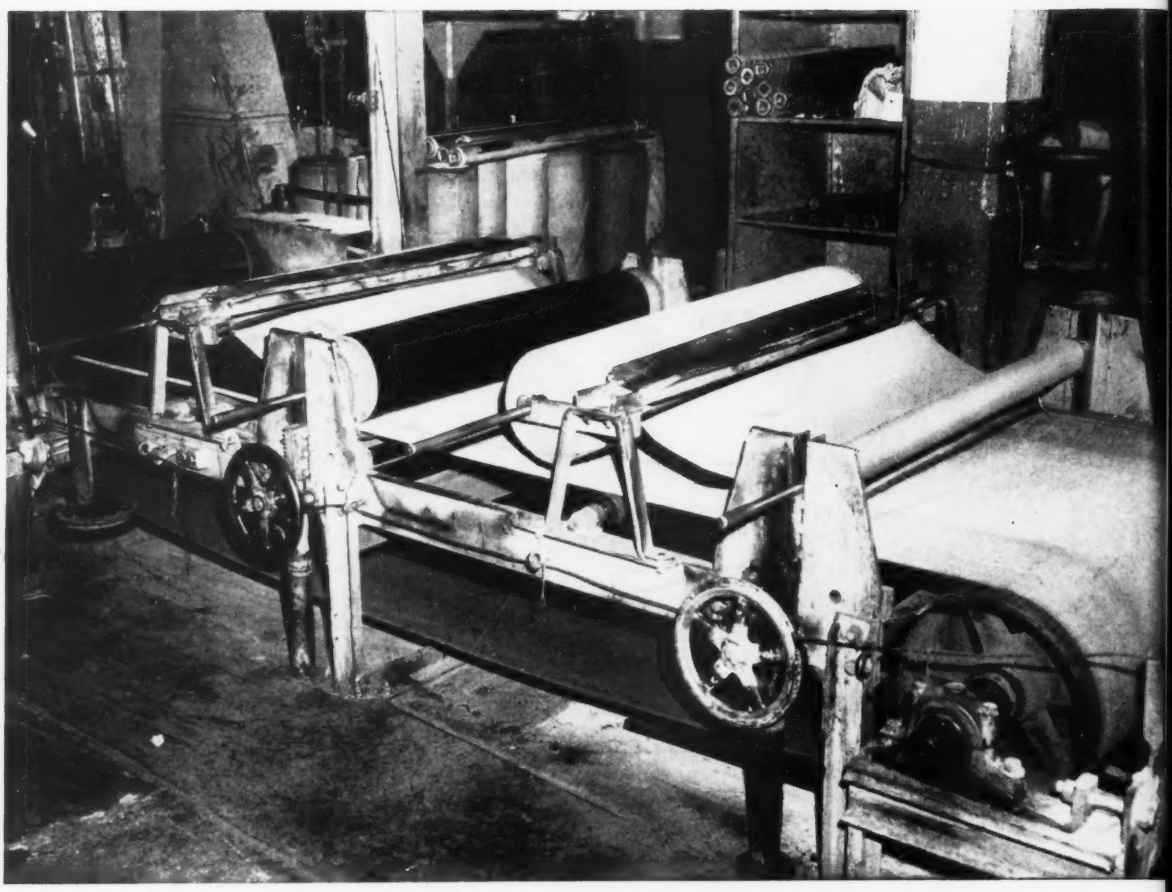

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